Exhibit C-1: Development Plan

Development Plan

PETERSEN RANCH MITIGATION BANK
LEONA VALLEY, LOS ANGELES COUNTY, CALIFORNIA

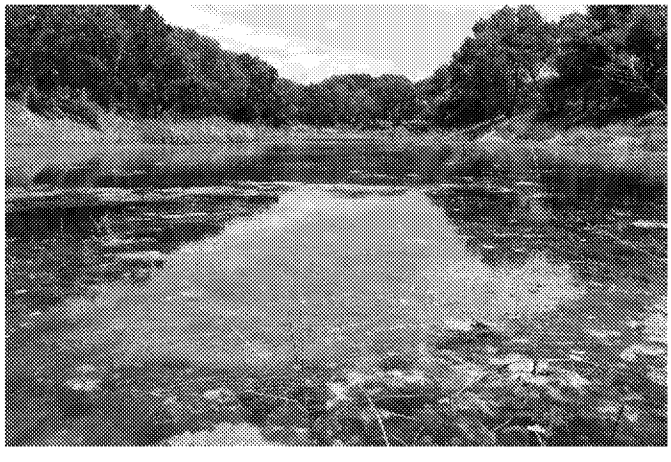
Prepared For:
Interagency Review Team

Bank Sponsor:
Land Veritas Corp.
1001 Bridgeway #246
Sausalito, CA 94965
(415) 729-3734
Contact: Tracey Brownfield
tracey@landveritas.com

Property Owners:
LV Lake Elizabeth, LLC. and LV-BP Investors Ranch, LLC.
1001 Bridgeway #246.
Sausalito, CA 94965
(415) 729-3734
Contact: Tracey Brownfield
tracey@landveritas.com

Consultant:
WRA, Inc.
9815 Carroll Canyon Road
Suite 206
San Diego, CA 92131
Contact: Tim DeGraff

Date:
March 2016



wra
ENVIRONMENTAL CONSULTANTS

9815 Carroll Canyon Rd, Suite 206, San Diego CA 92131 ph: 858-776-7444 info@wra-ca.com www.wra-ca.com

This Page Intentionally Blank

EXECUTIVE SUMMARY

Land Veritas Corp. proposes to establish the Petersen Ranch Mitigation Bank (Bank) in unincorporated Leona Valley, Los Angeles County, California. The Bank contains approximately 4,103 acres and consists of two properties in Leona Valley, California: The Petersen Ranch Bank Property (approximately 3,789 acres) and the Elizabeth Lake Bank Property (approximately 314 acres). Implementation of the Bank's Development Plan will result in the establishment/re-establishment, rehabilitation, enhancement, and/or preservation of many aquatic features including streams, wetlands, alluvial floodplains, and non-wetland riparian areas to mitigate for impacts authorized through Section 404 of the Clean Water Act, the Porter-Cologne Water Quality Control Act (Porter-Cologne), and Section 1600 of the California Fish and Game Code (CFG code). In addition to the features described above, the Bank Properties contain habitat for Swainson's hawk (state threatened species) as well as other special-status species including, but not limited to, western pond turtle, tricolored blackbird and coast horned lizard. Several sensitive vegetation communities are also present. Therefore, Land Veritas Corp. proposes that the United States Army Corps of Engineers (USACE), Environmental Protection Agency (USEPA), Lahontan Regional Water Quality Control Board (Lahontan RWQCB) and California Department of Fish and Wildlife (CDFW) be signatory participants in the Interagency Review Team (IRT). Tricolored blackbird credits will not be requested at this time. If they are requested in the future, they will be proposed in an addendum and reviewed by the IRT.

Mitigation actions in the Bank Properties will aim to restore and/or preserve the sensitive habitat resources described above. The Development Plan includes actions such as restoring fire-affected sites; restoring degraded and altered wetland, stream, and alluvial floodplain systems; planting and rehabilitation in existing riparian woodland; and other tasks. These actions are detailed in this document.

The Bank will be established, and conservation easements will be placed over the Bank Properties, in phases to meet the market demand for mitigation within the service area(s). The Bank Properties will be established in multiple phases comprised of six geographic areas (Area A – Area F)[1] through implementation of this Development Plan and Bank Enabling Instrument (BEI), which will define the establishment/re-establishment, rehabilitation, preservation, and enhancement activities, monitoring methods, and the recordation of a conservation easement over the entirety of the Bank Properties. The Bank Properties will be managed in perpetuity for the benefit of the Bank Properties' conservation values with funding provided by a non-wasting endowment.

The Bank will be established in phases. Phase I of the Bank will include the recordation of conservation easements and implementation of restoration actions within Area A on the Petersen Ranch Property (described more fully in Part II of this Development Plan) and Area E of the Elizabeth Lake Property (described in Part VI of this Development Plan). Subsequent phases will be constructed and incorporated into the Bank over time. The order in which the remaining areas (areas B, C, D and F) will be incorporated into the Bank will depend on market demand and the mitigation needs within the Bank's service areas.

---

1 The legal descriptions of the Elizabeth Lake Bank Property refers to Area E as Phase 1 North and Phase 1 South and Area F as Phase 2 East and West

This Page Intentionally Blank

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

LIST OF ACRONYMS

AA	Assessment Area
ANF	Angeles National Forest
BLM	Bureau of Land Management
BEI	Bank Enabling Instrument
BRI	Biological Resources Inventory
Cal-IPC	California Invasive Plant Council
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFG Code	California Fish and Game Code
USACE	Unites States Army Corps of Engineers
CNDDB	California Natural Diversity Database
CRAM	California Rapid Assessment Method
CWA	Clean Water Act
DRECP	Desert Renewable Energy Conservation Plan
USEPA	United States Environmental Protection Agency
HUC	Hydrologic Unit Code
IMP	Interim Management Plan
IRT	Interagency Review Team
LADWP	Los Angeles Department of Water and Power
LEWC	Lake Elizabeth Water Company
LTMP	Long-Term Management Plan
MSDS	Material Safety Data Sheet
OHWM	Ordinary High Water Mark
Lahontan RWQCB	Lahontan Regional Water Quality Control Board
SCE	Southern California Edison
Section 1600	Section 1600 of the California Fish and Game Code
Section 404	Section 404 of the Clean Water Act
SHPO	State Historic Preservation Officer
UPS	Uniform Performance Standard
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Service
VA Consulting	VA Consulting, Inc.
VCS	VCS Environmental
WRA	WRA, Inc.

PART I. OVERVIEW OF THE PETERSEN RANCH MITIGATION BANK

The Petersen Ranch Mitigation Bank consists of two Bank Properties near Leona Valley, Los Angeles, California: The Elizabeth Lake Bank Property and the Petersen Ranch Bank Property. This section details the site-wide existing conditions and other characteristics of these Bank Properties as well as the surrounding lands and need for the Bank. General summaries of regulatory information and methodology for determining credits are also described in this section. The Development Plans of each individual restoration site are detailed individually in subsequent sections of this document.

1.0 GOALS

This Bank Development Plan has been prepared for the 4,103 acre Petersen Ranch Mitigation Bank (Bank) consisting of two properties in unincorporated Los Angeles County: the Petersen Ranch Mitigation Bank Property, which comprises approximately 3,789 acres, and the Elizabeth Lake Bank Property, which comprises approximately 314 acres (Figure 1). The purpose of this document is to govern the rehabilitation, establishment/re-establishment enhancement, and preservation activities that are being conducted on the Bank in order to establish credits. The Bank will provide compensatory mitigation for Section 404, Section 1600, and Porter-Cologne Act wetlands, waters, and non-wetland riparian habitats, as well as Swainson's hawk and California Environmental Quality Act (CEQA) sensitive habitats.

The goals of the Bank are to:

1) Restore, enhance and maintain ideal habitat conditions to encourage the proliferation of the special-status species known to occur, currently or historically, on the Bank Properties;

2) To assist in their recovery and eventual removal from their respective special-status lists;

3) To preserve sensitive upland, wetland, stream, buffer, and riparian habitat;

4) To establish, re-establish, rehabilitate, enhance, and/or preserve waters of the U.S./State and adjacent buffer habitat, resulting in the gaining or maintaining of aquatic resource functions; and

5) To allow the sale of credits as off-site compensatory mitigation for any of the following impacts within the Service Areas:

   a) unavoidable impacts to Waters of the United States, including wetlands, which result from activities authorized under Section 404 of the Clean Water Act (CWA; hereinafter "Section 404");

   b) impacts to Swainson's Hawk (*Buteo swainsoni*), a State of California-listed threatened species under the California Endangered Species Act California Fish and Game Code Section 2050 et seq. (CFG Code; hereinafter "CESA");

   c) potentially significant impacts to wetland and wildlife resources under the applicable sections of the California Environmental Quality Act, Public Resources Code Section 21000 et seq. (hereinafter "CEQA");

   d) unavoidable impacts to Waters of the State of California that result from activities authorized under Section 1600 et seq. of the CFG Code (hereinafter "Section 1600"); and

   e) unavoidable impacts to Waters of the State of California that result from activities authorized under the Porter-Cologne Act (hereinafter "Porter-Cologne").

Several types of credits are proposed to be developed and sold for wetlands, streams, non-wetland riparian, alluvial floodplains, sensitive habitats, and special-status species in the Bank Properties. It is proposed that habitat establishment/re-establishment, rehabilitation, enhancement, and preservation credits be earned through the implementation of this Development Plan, the Interim Management Plan (IMP), the Long-Term Management Plan (LTMP), and the placement of conservation easements submitted as part of the Bank Enabling Instrument (BEI).

The Bank will be established in phases. Phase I of the Bank will include the recordation of conservation easements and implementation of restoration actions within Area A on the Petersen Ranch Property (described more fully in Part II of this Development Plan) and Area E of the Elizabeth Lake Property (described in Part VI of this Development Plan). Subsequent phases will be constructed and incorporated into the Bank over time. The order in which the remaining areas (areas B, C, D and F) will be incorporated into the Bank will depend on market demand and the mitigation needs within the Bank's service areas.

1.1 Responsible Parties

Bank Sponsor:
Land Veritas Corp.
1001 Bridgeway #246.
Sausalito, CA 94965
(415) 729-3734
Contact: Tracey Brownfield
Tracey@landveritas.com

2.0 BANK PROPERTIES BASELINE INFORMATION

2.1 Bank Location

The Bank Properties are located near the unincorporated community of Leona Valley in Los Angeles County, California. The Elizabeth Lake Bank Property is located to the south of Elizabeth Lake Road and encompasses a portion of Elizabeth Lake. The Petersen Ranch Bank Property is located to the north of Elizabeth Lake Road and encompasses portions of Portal Ridge and the San Andreas Fault Rift Zone. The Bank Properties are approximately 4,103 acres, of which approximately 314 acres are encompassed by the Elizabeth Lake Bank Property and approximately 3,789 Acres are encompassed by the Petersen Ranch Bank Property. The Petersen Ranch Bank Property is located in the Del Sur United States Geologic Service (USGS) 7.5-minute quadrangle and the Elizabeth Lake Bank Property is located in the Lake Hughes USGS 7.5-minute quadrangle. The Bank Properties are near the northern boundary of the Angeles National Forest (ANF), west of the City of Palmdale and south of Antelope Valley (Figures 1-3). Historic aerial images of each Bank Property are included in Figure 4 and Figure 5.

2.2 Ownership Status

The Elizabeth Lake Bank Property is owned by LV Lake Elizabeth, LLC. The Petersen Ranch Bank Property is owned by LV-BP Investors Ranch, LLC. The Bank is sponsored by Land Veritas, Corp. The Easement Holder will be Southwest Resource Management Association.

2.3 Bank Property Description

2.3.1 Elizabeth Lake Bank Property

Elevations within the Elizabeth Lake Bank Property range from approximately 3,270 to 3,700 feet. The site generally drains from south to north with surface flows exiting the relatively steep side canyons (15 to 20 percent slopes) and draining onto the relatively flat valley bottom (less than four percent slopes). The valley is a rift valley created by the San Andreas Fault and contains numerous low-lying wetland and naturally ponded areas called sag ponds. Elizabeth Lake is the largest sag pond in the valley that, when full, drains west through a series of other sag ponds to the Santa Clara River. The soils within the Elizabeth Lake Bank Property consist of sandy alluvium and residuum. These friable soils are moderately to severely susceptible to erosion.

Several biological studies have been conducted within the Elizabeth Lake Bank Property, including:

- Biological Resources Inventory (BRI; WRA 2011);
- Wetland Delineation Report (WRA 2012, verified February 5-6, 2014);
- Preliminary Engineering Report (VA Consulting, Inc 2014);
- Hydraulic and Sediment Transport Capacity Study of Munz Canyon (VA Consulting, Inc 2013);
- Rare Plant Surveys (WRA 2011); and
- Fire intensity mapping

Based upon the biological studies performed by WRA, the Elizabeth Lake Bank Property was observed to support sensitive habitats including streams, alluvial floodplains, riparian habitat, open water, wetlands, sensitive natural communities and potential habitat for several special-status species.

The entire Elizabeth Lake Bank Property was burned by the Powerhouse Fire in late May and early June of 2013. Before the fire, the Elizabeth Lake Bank Property contained mostly native vegetation communities, although some of the communities developed in response to human disturbance as described in Section 2.4.1. The hills in the southern portion of the Elizabeth Lake Bank Property were dominated by native chaparral and scrub communities and supporting interior live oak scrub (*Quercus wislizeni* var. *frutescens*). Dominant species included chamise (*Adenostoma fasciculatum)*, interior live oak, birch leaf mountain mahogany (*Cercocarpus betuloides [C. montanus]*), and California buckwheat (*Eriogonum fasciculatum*). Valley bottoms contained thick stands of basketbrush (*Rhus aromatica* [*R. trilobata*]) and thick leaf yerba santa (*Eriodictyon crassifolium*). Small pockets of open ground were dominated by non-native annual grasses and associated species (See Exhibit H of the BEI for more details).

Portions of the Elizabeth Lake Bank Property support dense stands of riparian vegetation including along the margins of Elizabeth Lake and in the topographic bottom of the San Andreas Fault. While some riparian vegetation communities are supported by surface water flows during the rainy season, others have no apparent indicators of ordinary high water associated with them, and are likely supported by a seasonally high groundwater table in the rainy season. Dominant overstory species included Fremont cottonwood (*Populus fremontii)* and red willow (*Salix laevigata)*. Understory species composition within riparian stands vary from dense thickets of Mexican rush (*Juncus mexicanus)* to nearly bare ground under thick mats of leaf litter. The majority of the riparian vegetation experienced only low to moderate burn severity and is likely to recover naturally with only minor rehabilitation actions.

Several types of seasonal and perennial wetland vegetation communities were observed within the Elizabeth Lake Bank Property, including seasonal riparian, seasonal seep, seasonal depressional wetlands (detention basins), and perennial wetland fringe (emergent marsh). Seasonal wetlands varied in species composition and hydrological period depending on topographical position and in some instances, prior human modification of the local hydrological regime. Perennial wetland fringe dominated by California bulrush (*Schoenoplectus* [*Scirpus*] *californicus*) lined the shallow margins of Elizabeth Lake.

Alluvial floodplain systems were mapped within the Elizabeth Lake Bank Property and were sparsely vegetated with California buckwheat and rubber rabbitbrush (*Ericameria nauseosa*). Rabbitbrush scrub was the largest vegetation community within the Elizabeth Lake Bank Property and was dominated by rubber rabbitbrush and to a lesser extent wild tarragon (*Artemisia dracunculus*). Rubber rabbitbrush is a fast-growing, early-seral shrub that establishes after disturbance (Sawyer et al. 2009). Associated species included California buckwheat, cheatgrass (*Bromus tectorum*), and red brome (*Bromus madritensis*). Areas mapped as mixed chaparral represent a complex of many separate vegetation alliances recognized and defined in the Manual of California Vegetation (Sawyer et al. 2009) several of which may be considered sensitive by the CDFW. Stands mapped as mixed chaparral were co-dominated by two or more shrub species. The most common dominant species in stands of this vegetation type included chamise, whitethorn ceanothus (*Ceanothus leucodermis*), buckbrush (*Ceanothus cuneatus* var. *cuneatus*), interior live oak, big berry manzanita (*Arctostaphylos glauca)*, and birch leaf mountain mahogany.

The freshwater marsh habitat in the northern portion of the Elizabeth Lake Bank Property, dominated by dense canopies of tules (*Schoenoplectus* spp.), is documented habitat for the tricolored blackbird. In addition, the Elizabeth Lake Bank Property contains Fremont cottonwood forest along the margins of Lake Elizabeth and in low-lying areas adjacent to Lake Elizabeth Road. Western pond turtle (*Actinemys marmorata,* CDFW Species of Special Concern) is documented to occur in large numbers within Elizabeth Lake. Coast horned lizard (*Phrynosoma coronatum*, State Species of Special Concern) has been documented to occur near Elizabeth Lake (ECORP 2009, CDFW 2013, WRA 2012) and the Elizabeth Lake Bank Property contains large amounts of habitat that can support this species.

Several special-status wildlife species have been documented or have high potential to occur within the Elizabeth Lake Bank Property based upon assessment of the California Natural Diversity Database (CNDDB) and historic sightings. Within five miles of the Elizabeth Lake Bank Property (See Exhibit H of the BEI) the following special-status species have been documented in the CNDDB: Tehachapi pocket mouse (*Perognathus alticolus inexpectatus*, CDFW Species of Special Concern), coast horned lizard (CDFW Species of Special Concern), western pond turtle (CDFW Species of Special Concern), American badger (*Taxidea taxus*, CDFW Species of Special Concern), patch-nosed snake (*Salvadora hexalepis virgultea*, CDFW Species of Special Concern), southwestern willow flycatcher (*Empidonax traillii extimu*s, State Endangered, Federal Endangered), yellow warbler (*Dendroica petechia brewsteri*, CDFW Species of Special Concern), and yellow-breasted chat (*Icteria viren*, CDFW Species of Special Concern). Many of these species have been documented in or around Elizabeth Lake. Anecdotal evidence in area news sources and websites indicates that several other migratory birds and bats utilize the habitats around Elizabeth Lake including the bald eagle (*Haliaeetus leucocephalus*, State Endangered).

2.3.2 Petersen Ranch Bank Property

Several biological studies have been conducted within the Petersen Bank Property, including:

- Biological Resources Inventory (BRI; WRA 2013a);
- Rare Plant Surveys (WRA 2013a)
- Wetland Delineation Report (WRA 2013b, verified February 5-6, 2014); and
- Swainson's Hawk Habitat Assessment (Bloom 2013)

Based upon the biological studies performed by WRA, the Petersen Ranch Bank Property supports sensitive habitats including streams, riparian habitat, open water, wetlands, and sensitive terrestrial communities. The Petersen Ranch Bank Property also contains habitat for several special-status species known to occur or with a potential for occurrence in the Petersen Ranch Bank Property. Further information is included in Exhibit H of the BEI.

Elevations within the Petersen Ranch Bank Property range from approximately 3,250 to 3,975 feet (Google 2013). The site has steep slopes that support extensive riparian, chaparral, and desert scrub communities. The Petersen Ranch Bank Property contains 23 soil types with a wide range of textures. Soils in wetland complexes in the valley bottom are typically clay loams while soils on steep slopes are typically prone to erosion and consist of sandy to coarse rocky loams. The Petersen Ranch Bank Property supports several freshwater emergent wetland complexes including marshes, seasonal swales, wet meadows, depressions, and seeps. The Petersen Ranch Bank Property also contains large canyons with ephemeral streams and riparian canopy (See Exhibit I of the BEI). The Petersen Ranch Bank Property is approximately 3,789 acres located in the Del Sur 7.5 minute USGS quadrangle (Figure 3), California (Hernandez 2010). The Petersen Ranch Bank Property offers a large diversity of vegetation and habitat including streams, wetlands, woodlands, chaparral and grasslands. Many of the vegetation alliances and associations within these communities are listed as sensitive by the CDFW. Additionally, the Bank contains many special-status species. A large portion of the Bank supports grazed grasslands on slopes with intermixed chaparral and wetland communities. Many ephemeral streams throughout The Petersen Ranch Bank Property and large, emergent marshes support riparian and wetland habitat on the Property. The Petersen Ranch Bank Property is bounded by the California Aqueduct to the north (Figure 1), and by Elizabeth Lake Road to the south.

The Petersen Ranch Bank Property also contains state listed and special-status species including Pierson's morning glory (*Calystegia peirsonii,* CNPS Rank 4), Swainson's hawk (*Buteo swainsoni*, State Threatened), tricolored blackbird, American white pelican (*Pelecanus erythrorhynchos*, CDFW species of special concern), ferruginous hawk (*Buteo regalis,* CDFW species of special concern), prairie falcon (*Falco mexicanus,* CDFW species of special concern), Nuttall's woodpecker (*Picoides nuttallii,* CDFW species of special concern), loggerhead shrike (*Lanius ludovicianus,* CDFW species of special concern), oak titmouse (*Baeolophus inornatus,* CDFW species of special concern), and coast horned lizard as well as 22 sensitive vegetation alliances (including wetlands and non-wetland waters). These vegetation alliances are mapped and described in the BRI produced by WRA (WRA 2013a; Exhibit H of the BEI).

2.4 Site History and Existing Conditions

2.4.1 Elizabeth Lake Bank Property

Vegetation within portions of the Elizabeth Lake Bank Property bears signs of human disturbance, including the site of the former Munz Ranch, and ranch roads, dams, remnant orchards and limited other infrastructure. Most of the gently rolling hills and slopes were in agricultural production during the 1900s, and remnant portions of fruit tree orchards were still present before the fire. Recently, much of this cultivated land had converted to shrubland or non-native annual grassland as the vegetation recovers from this prior disturbance. Dominant species within shrublands included rubber rabbitbrush and wild tarragon. Non-native annual grasslands were dominated by brome grasses including red brome, ripgut brome (*Bromus diandrus*), and cheatgrass.

The valley floor around Elizabeth Lake has been modified and disturbed since the 1800's from the construction of roads, impoundments, and buildings. Many of the remaining building structures from the former Munz Ranch were destroyed in the fire. Historically, runoff was concentrated into the steep canyons and was released onto the valley over large alluvial floodplains that consist of mixed cobbles and sand in braided channels vegetated with mixed sage scrub habitats. These flows eventually collected in the low-lying sag ponds that were bordered by wetland vegetation, riparian habitats and in some cases large bodies of open water.

The construction of four earthen berms at the mouths of the canyons have eliminated these alluvial floodplains in the Elizabeth Lake Bank Property. These berms historically detained storm water during rain events and collected the storm water in basins, which then seeped into the ground. These berms have not been maintained over the years and two of the larger berms, in Lucky and Munz canyons, have washed out. These washouts have caused the flows to be conveyed in deeply incised channels, which confine the high flow events and prevent storm water from reaching the alluvial floodplains.

Dispersed, flashy flows are necessary to form and maintain braided stream channels and to provide the regular patterns of disturbance to which species of alluvial floodplain habitats have adapted. The construction of the berms eliminated these types of flows from the historic floodplain and has resulted in a substantial reduction of intact alluvial floodplain habitats within the Elizabeth Lake Bank Property.

2.4.2 Petersen Ranch Bank Property

The Petersen Ranch Bank Property has been heavily altered in the past. Historic images from 1948 show wide-scale grading and clearing of brush and trees. Additionally, the Petersen Ranch Bank Property has been intensively grazed by cattle for many years. Open waters exist in the Petersen Ranch Bank Property in the form of deep ponds excavated in wetlands. These ponds were historically augmented with water supplied by the Lake Elizabeth Water Company (LEWC) and pumped onsite via a network of water pipes. Pumping ceased in 2010. Since then, these ponds have become encroached upon by non-native upland vegetation typical of disturbed soils. These ponds are surrounded by high berms with little natural topography remaining. Without pumping, these ponds are unlikely to be sustained as open water habitat under normal conditions and adjacent wetland habitat will continue to be negatively impacted by the reduced natural flow. Additionally, due to the depth and berming of these ponds, water does not continue to flow downslope, restricting the contribution of subsurface flows to the watershed system. Instead, the ponds act as a sink, collecting water from the adjacent overland and subsurface flow, which then evaporates over time.

Other depressional or seep wetlands occur scattered across the hillsides in the Petersen Bank Property. Many of these have been modified as watering areas or spring boxes for cattle. Minor to moderate weed infestations are visible in many wetlands and included species such as bull thistle (*Cirsium vulgare)* and Russian knapweed (*Acroptilon repens)*.

Despite the high amounts of historic disturbance in the Petersen Ranch Bank Property, much of the Petersen Ranch Bank Property contains highly valuable habitat and vegetation communities including scrubland, woodland, alluvial floodplains, and other habitat types. Much of the undisturbed habitat is found on the steep slopes of canyons in the northern portion of the Petersen Ranch Bank Property. Additionally, some areas in the southern portion of the Petersen Ranch Bank Property (Area A and Area D) appear to be rebounding from the disturbance, evidenced by native, perennial forbs including California buckwheat as well as mid- to late-seral stage species including big berry manzanita, chamise, and thick leaf yerba santa.

Other areas, particularly the wetland complexes, do not appear to be rebounding naturally. This is largely due to the altered hydrologic regimes caused by berming, roads, and pond construction, as well as the more recent and frequent disturbance from grazing, pond excavation, and pond maintenance.

The Petersen Ranch Bank Property also contains many ephemeral streams. Many of these streams are located north of Johnson Road and provide high quality habitat due to inaccessibility caused by difficult terrain. Some streams in lower reaches are somewhat altered. Petersen Stream, which runs near the wetland complex in the rift valley bottom, is bermed and channelized.

2.5 Surrounding Land Uses

The Elizabeth Lake Bank Property borders the ANF to the north and south, a residential development to the east, and Painted Turtle, a camp for children with serious illnesses to the west.

The Petersen Ranch Bank Property is adjacent to the ANF, which is located to the southwest. Ranches and agricultural fields with small, individual houses separate the ANF from the Petersen Ranch Bank Property. Small, residential developments are located southeast of the Petersen Ranch Bank Property, along Johnson Road, and residential and recreational areas are located to the west of the Petersen Ranch Bank Property. The Petersen Ranch Bank Property is bordered by the California Aqueduct to the north.

In additional to the ANF, other significant protected areas surround the Petersen Ranch Bank Property, including Antelope Valley Poppy Preserve to the northwest; and California Desert Conservation Area Bureau of Land Management (BLM) managed land to the north.

2.6 Zoning

The Elizabeth Lake Bank Property is located in an unincorporated section of Los Angeles County and the majority of the Elizabeth Lake Bank Property is zoned R-R: Resort and Recreation, A-1 or A-2: Light and Heavy Agricultural. The smaller portion of the Elizabeth Lake Bank Property, north of Elizabeth Lake Road is zoned R-A: Residential/Agricultural. These zones allow for the development of commercial and recreational facilities on the R-R zone and intensive agricultural practices on the Agricultural zones.

The Petersen Ranch Bank Property is located in an unincorporated section of Los Angeles County. The majority of the Petersen Ranch Bank Property is zoned "A-2: Heavy Agricultural." Portions of the Petersen Ranch Bank Property located north of Johnson Road are zoned "A-1: Light Agriculture".

2.7 Existing Easements and Encumbrances

2.7.1 Elizabeth Lake Bank Property

Elizabeth Lake Road is a public road that forms the northern border of the Elizabeth Lake Bank Property. This road is managed by Los Angeles County and the right-of-way for this road has been excluded from the Elizabeth Lake Bank Property. There is a single road easement running north to south through the center of the Elizabeth Lake Bank Property that varies in width. On some maps this easement is named South Portal Road but the road is not actively used and is gated at the Elizabeth Lake Bank Property boundary. This road easement is held by the U.S. Department of Agriculture (USDA) as a potential access road into the Angeles National Forest (ANF) and allows the USDA to construct and maintain a road within this easement. The Bank Sponsor and Property Owner are working with the ANF to relocate this easement along the western edge of the Munz Canyon alluvial floodplain restoration area. This proposed road alignment also overlaps with a trail easement held by the State of California.

Three utility easements are recorded on the eastern region of the Bank Property: a 1971 telephone easement to General Telephone Company that runs parallel to the shore of Elizabeth Lake, and two utility line easements for Southern California Edison. These easements were likely intended to convey electricity and telephone service to the structures that previously existed on the Elizabeth Lake Bank Property and ongoing maintenance or activity within these easements is not expected. Additionally, there is an easement that grants access to a well area just south of Elizabeth Lake Road, for a residential well that provides water to two single-family homes near the Bank Property.

Finally, there is a right of access granted in the deed that allows for ingress and egress from a burial plot. This burial plot is located on a parcel that is surrounded by, but is not a part of the Elizabeth Lake Bank Property. All existing easements and the burial plot are described in the Property Assessment and Warranty (Exhibit E-2 of the BEI).

2.7.2 Petersen Ranch Bank Property

Elizabeth Lake Road is a public road that primarily delineates the southern boundary, and the western edge of Petersen Ranch Bank Property. Johnson Road runs through the north-central region of the Petersen Ranch Bank Property. These roads are not a part of the Petersen Ranch Bank Property and are managed by Los Angeles County.

A number of easements for future street and utility improvements are recorded in the northern portion of the Petersen Ranch Bank Property (Area B), associated with previously planned residential development. However, no residential development is currently planned in this area. Other dirt roads and right of way easements exist in a variety of locations and are described more fully in the Exhibit E-2 of the BEI.

Utility easements exist within the Petersen Ranch Bank Property in a number of locations. The Tehachapi Renewable Transmission Project bisects the central portion of the Petersen Ranch Bank Property from the north to the south, and includes a combination of easements for unpaved access roads, utility poles, and high voltage power lines. Another transmission line owned and maintained by the Los Angeles Department of Water and Power (LADWP) crosses the western portion of the Bank Property. This transmission line is located within a parcel that is not a part of the Petersen Ranch Bank Property. Maintenance of these utility lines may occur periodically, including modification of vegetation, and the LADWP has legal access rights through portions of the Bank Property. The LADWP transmission line passes over the rift valley wetland complex and other aquatic resources within the Petersen Ranch Bank Property. Restoration will be conducted underneath this transmission line, but credits will not be requested for land in this parcel.

In addition to the easements outlined in the title report, a 320-acre portion of Petersen Ranch Area A, has been used previously as mitigation for Southern California Edison (SCE) and has a separate conservation easement. This SCE easement will be managed as part of the Bank, and the annual monitoring reports will cover the Bank easements as well as the SCE easement, but credits will not be requested for land located under this easement. Additionally, there are exclusion areas that are controlled by the Property Owner but will not be a part of the Petersen Ranch Bank Property and several parcels along Johnson Road that are not controlled by the Property Owner.

3.0 SITE SELECTION AND NEED

The service areas that will be served by the Bank are expected to see continued urban growth, suburban residential development, and renewable energy, mining, and other resource development projects in the coming years. Figures from the Antelope Valley Integrated Regional Water Management Plan (IRWMP; Regional Water Management Group (RWMG) 2013) showed an expected population increase of 153 percent from 2010 to 2035. These developments are expected to take place in areas that are currently considered to be natural areas (RWMG 2007). Additionally, metropolitan areas within the Santa Clara River Sub-basin face high rates of urbanization and developmental pressure. The Bank will help mitigate for impacts incurred by these developments in a service area that currently includes only one approved mitigation bank, the Santa Paula Creek Preservation Bank. The Santa Paula Creek Preservation Bank has less than 120 preservation credits potentially available, does not cover the Fremont-Antelope Valley Sub-basin, and can only be used in limited circumstances because no enhancement, rehabilitation, or establishment/re-establishment has taken place within the property.

The Fremont-Antelope Valley Sub-basin does not contain any approved mitigation banks, despite the growing need for mitigation banks due to renewable energy projects and other developments. Additionally, the Santa Clara River Sub-basin only contains one approved mitigation bank, despite high pressure for continued urban development in Santa Clarita, Filmore, Santa Paula, Ventura, and the Los Angeles metropolitan area. Due to its location on the boundary line between the Santa Clara River Sub-basin and the Antelope-Fremont Valley Sub-basin Hydrologic Unit Code 8 (HUC-8), the Bank will provide mitigation options for portions of both sub-basins. The Bank will provide a mitigation source that will support the goals of the Desert Renewable Energy Conservation Plan (DRECP), West Mojave Desert Management Plan (BLM 2005); local interest groups including the Sierra Club, Friends of Santa Clara River, Southern California Wetland Recovery Project, and the Nature Conservancy; and local watershed plans in both the Santa Clara River and Fremont-Antelope Valley sub-basins (Table 1).

The Bank Properties contain many important ecological features that would provide valuable ecosystem services to the region. The Bank Properties contain many wetlands, a rare habitat type in the arid Antelope Valley region, other aquatic habitats, and sensitive terrestrial vegetation communities (Exhibit H of the BEI). Many of these features have been manipulated due to historic agricultural practices such as excavation of ponds, creation of berms, and manipulation of water flow. Despite the current condition of the Bank Properties, historic aerial images show that a large continuous wetland once spanned the main valley of the Petersen Ranch Bank Property (Figure 5). Restoration of this original wetland habitat is planned along a large expanse of these wetlands.

Restoration of these wetlands will create more natural flow patterns, remove watershed obstructions, increase native wetland vegetation, expand continuous wetland habitat, and increase hydrologic function of surrounding wetlands as well as downstream aquatic habitats in both the Santa Clara River and Antelope-Fremont Valley sub-basins (HUC-8). This is particularly important due to the impaired waters downstream of the Petersen Ranch Bank Property in the Santa Clara River Sub-basin (CEPA 2010).

Elizabeth Lake, Lake Hughes, and Munz Lake are located in the Santa Clara River Sub-basin downstream of the Bank Properties. These lakes are impaired for a variety of reasons including eutrophication, low dissolved organic oxygen/organic enrichment, altered pH, trash, algae, fish kills,

and odors (CEPA 2010). Many of these impairments are of non-point origins. Factors including nutrient inputs from cattle and agriculture often cause and contribute to many of these impairments, including eutrophication, algal blooms, and fish kills (Anderson et. al 2002, Carpenter et. al 1998). Restored, vegetated wetlands are known to help filter roadside runoff, anthropogenic nutrient inputs, heavy metals, and other water contaminants that could flow downstream (Davies and Bavor 2000, Coveney et. al 2002). Additionally, excluding cattle from wetland areas as part of the restoration process will decrease the amount of nutrients contributed by cattle manure into downstream water bodies. Restoration of wetlands in the Bank Properties may help to reduce the amount of contaminants entering Elizabeth Lake, Munz Lake, Lake Hughes, and other downstream water features.

This Bank will provide a variety of wetland and riparian credits, as well as credits for special-status species, 15 sensitive vegetation alliances, and 31 native vegetation alliances. Special-status species include, but are not limited to, Swainson's hawk, a California threatened species (WRA 2013a, Exhibit H of the BEI). The Bank Properties provide extensive habitat for these species including foraging area in grasslands, marshes, and low-density shrubland as well as nesting sites in riparian woodland (Bloom 2013, WRA 2013a, Exhibit H of the BEI).

The Bank Properties are also surrounded by significant protected areas including the ANF to the south and west, Antelope Valley Poppy Preserve to the northwest, and California Desert Conservation Area BLM land to the north. The Bank will provide connectivity between these areas and preserve land targeted as part of the San Andreas Rift Zone (SEA) by Los Angeles County (LA County, 2012; See Exhibit H of the BEI). The Bank Properties are located in the landscape linkage between the Tehachapi Mountains, Castaic Mountains, and Antelope Valley identified by the California Wilderness Coalition Missing Linkages program (See Exhibit H of the BEI). The Bank would add additional protected lands to this corridor. The Bank will provide high quality wetland mitigation options for several resources in an urbanizing portion of Los Angeles County with few existing mitigation options. Additionally, the Bank would help local governments, non-profits, and the DRECP attain ecosystem conservation and enhancement goals as well as provide a source of mitigation credits for development projects.

Table 1. Goals of Local Interest Groups

Organization	Goal	How the Petersen Ranch Mitigation Bank will Fulfill this Goal
DRECP (DRECP 3/25/2013)	*1. Providing long-term conservation and management of Covered Species within the DRECP Plan Area*	The non-wasting endowment of the Bank will provide funding for the management and conservation of the Bank Properties in perpetuity. Additionally, Swainson's hawk has been observed in the Bank Properties. This species is a priority for conservation with the DRECP and is listed on the DRECP covered species list (DRECP 4/10/2013). Many special-status species including Nuttall's woodpecker, loggerhead shrike, tricolored blackbird, and coast horned lizard, amongst others, have been observed in the Bank and may also support the goals of the DRECP.
	2. Preserving, restoring, and enhancing natural communities and ecosystems that support Covered Species within the DRECP Plan Area; avoiding impacts to these species.	The Bank will provide many conservation opportunities related to the DRECP including seasonal wet meadows and ephemeral stream restoration, enhancement, and establishment, and the preservation of habitat for special-status species, including Swainson's hawk (State Threatened), tricolored blackbird, coast horned lizard, and many CDFW sensitive vegetation communities.
	3. Preservation of wildlife corridors or essential connectivity	The Bank Properties support many wildlife corridors, including the San Andreas Rift Zone, Portal Ridge-Mojave Desert corridor, and a linkage from the Tehachapi Range through the Mojave Desert and into the Castaic Range. The Bank provides mitigation opportunities for projects that may impact similar corridors and provides opportunities for conserving and enhancing existing corridors.
Upper Santa Clara River Watershed Integrated Regional Water Management Plan (Kennedy/ Jenks 2008)	*1. Preserve and improve ecosystem health*	The Bank would help to preserve valuable and rare habitat in the Santa Clara River Sub-basin, including tricolored blackbird habitat, Swainson's hawk habitat, many sensitive terrestrial and aquatic vegetation alliances, and freshwater wetlands, which are increasingly rare to the area.
	2. Improve flood management	Restoration of the jurisdictional features in the Bank Properties will help return these features to their natural states, thereby reducing erosion and creating more natural hydrologic functionality. Improving wetland areas will also help to "dampen" potential floodwaters and act as a buffer to adjacent residences (USEPA 2006, Hey and Philippi 1995).
	3. Promote resource stewardship	The Bank Properties would be managed in perpetuity through a non-wasting endowment. This will aid in the continued stewardship of valuable habitat in the area.
Antelope Valley Integrated Regional Water Management Plan (RWMG 2007)	*1. Desire to preserve open space and the conflict between industry growth and preserving open space*	Residents of Antelope Valley identified "open space," "views," and "desert environment" as key components to the area's quality and desirability (RWMG 2007). Despite this, the population in the Antelope Valley region is facing increased demands for recreation, community development, and resource utilization that will impact these desirable features. Antelope Valley is expected to increase 121 percent between 2005 and 2020 and this growth will occur in places that are currently natural areas (RWMG 2007). The Bank will aid in creating a solution for this problem by setting aside undeveloped, high quality habitats with valuable natural resources (i.e. wetlands) that will aid in the mitigation for these expected developments while preserving open space, views, and an intact desert environment.
	2. Protecting endangered species	The predicted growth of the areas surrounding Antelope Valley will have an adverse effect on listed species due to increased anthropogenic factors, including off-highway vehicle use, pesticides, development, urban runoff, and other factors. The Bank will help to preserve foraging habitat for Swainson's hawk, a State Threatened species.
	3. Removing invasive, non-native species from sensitive ecosystems	Invasive species in the Antelope Valley area have an adverse impact on water quality, native plants and wildlife, native habitat, endangered species and water supply. Invasive species have caused increased flooding, erosion, and fire hazards. The restoration efforts of the Bank will aid in the removal of many of these invasive species as part of wetland rehabilitation, enhancement, and long-term management.

4.0 CREDITING BACKGROUND AND SUMMARY FOR THE BANK

4.1 Regulatory Background and Definitions

Many opportunities exist for the establishment/re-establishment, rehabilitation, enhancement and preservation of the sensitive resources within the Bank Properties. In accordance with the USEPA and USACE 2008 Mitigation Rule (33 CFR, Part 332), the full definitions for each mitigation type, as written in the USACE 2008 Mitigation Rule (33 CFR 332) are as follows:

> *"Establishment (creation) means the manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area and functions."*
>
> *"Re-establishment means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions."*
>
> *"Rehabilitation means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/ historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area."*
>
> *"Enhancement means the manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area."*
>
> *"Preservation means the removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions."*

Additionally, both rehabilitation and re-establishment fall under the CDFW definition of restoration. Therefore, Section 1600 CDFW mitigation credits in the bank indicated as rehabilitation or re-establishment credits correspond with CDFW restoration credits.

This section summarizes the different mitigation activities proposed to generate credits within the Bank Properties including seasonal wetlands, wetland riparian, perennial wetlands, non-wetland riparian, streams, alluvial floodplains, and sensitive terrestrial communities. More information on the mitigation activities and monitoring methodologies associated with these credits can be found in Sections 5.0 and 6.0, respectively, with more details given per area in Part II through Part VI of this document. The credits available within each Bank Property are depicted in Figures 6-14 and in Tables 2-8. More information on credits gained in each area of the Bank Properties is included in Parts II – VII. A detailed description of the crediting methodology is included in Exhibit F-1 of the BEI. The crediting approach and methodology, as determined by each agency, is described below.

4.1.1 USACE (404) Crediting Methodology and Determination

Ex. 4 CBI

Ex. 4 CBI

Ex. 4 CBI

Ex. 4 CBI

5.0 DEVELOPMENT PLAN SUMMARY FOR THE BANK

Previously disturbed aquatic and riparian areas with suitable soils, hydrology, and vegetation were investigated to identify opportunities for establishing, rehabilitating, re-establishing, and enhancing sensitive habitats in the Bank Properties.

The proposed establishment/re-establishment, rehabilitation, enhancement, and preservation activities (mitigation activities) will be implemented following Bank Establishment to generate the credits discussed in Section 4.0 and Parts II through Part VI below. A summary of the mitigation activities planned for the Bank Properties is shown in Figure 15 and 16 and described in detail in Parts II through Part VII of this Development Plan. Grading and in-stream construction will occur in the dry season between the months of May to October. Planting will occur in the fall to take advantage of fall and winter rains and increase likelihood of plant survival. Both seeding and container planting will occur. Where it is appropriate, container plantings will be irrigated for the first two or three years following initial installation to facilitate successful establishment and growth.

All existing and planned habitats within the Bank Property will be preserved in perpetuity by recordation of a conservation easement held by Southwest Resource Management Association, a non-profit entity. All habitats will be managed in accordance with this Development Plan, the IMP, and the LTMP for the benefit of the Bank's covered resources.

The Bank Properties will be established in multiple phases comprised of six geographic areas (Area A – Area F), with phased conservation easements placed over the Bank Properties to meet the market demand for mitigation within the service area(s). Phase I will consist of Area A and Area E.

5.1 Cattle Exclusion

Cattle will be excluded from select wetlands and other aquatic resources within the Bank Property through the use of cattle exclusion fencing. Cattle will also be excluding from planting and seeding areas until the native vegetation has successfully established. Cattle exclusion areas will include a minimum set-back buffer of 35 feet surrounding each aquatic resource (see Exhibit D-6 of the BEI). Water bodies (Elizabeth Lake and others) downstream of the wetlands in the Petersen Ranch Bank Property are impaired by nutrients, largely resulting from agricultural runoff in the form of manure and fertilizers. The high amounts of nutrients can lead to detrimental algal and bacterial blooms. The removal of cattle from select habitats will allow growth of dense wetland and riparian vegetation, thereby decreasing nutrient loads from cattle manure as well as increasing filtering of nutrients from the water column within the fenced habitats, prior to the water's movement to downstream water bodies.

Ex. 4 CBI

Ex. 4 CBI

Ex. 4 CBI

Ex. 4 CBI

In addition to the impaired waters downstream in the watershed, much of the main rift valley wetland complex and other, select wetlands have experienced high amounts of degradation due to a history of damage by cattle, in the form of trampling, overgrazing, and erosion. Cattle will be excluded from the rift valley aquatic resources and other select resources by the installation of a perimeter of wildlife-friendly fencing (Figure 15 and 16). These wetlands will also be managed and monitored for potential weed infestations, as described in Section 7.3. Exclusion of cattle from the main rift valley and restoration sites will allow for establishment of vegetation and ensure successful restoration. It will also enhance contiguous wetland habitats within the exclusion area and aide in the recovery of these habitats from the historic impacts of over-grazing. Although cattle will be excluded from the resources in the main rift valley and select wetland features with semi-perennial hydrology or riparian vegetation, cattle will not be excluded from a number of preserved seasonal depression or swale wetlands elsewhere in the Bank Property

When handled properly, cattle can act as a useful management tool. Low- to moderate-intensity cattle grazing can be particularly useful in managing the health of seasonal wetland habitat. Because of this, many small, seasonal wetlands will still utilize low- to moderate-density, managed grazing to control weeds, increase biodiversity within the wetlands, and reduce shrub encroachment. Many studies have shown that seasonal and ephemeral wetlands dominated by annual species, and surrounded by annual, non-native grasses benefit from low- to moderate-intensity grazing (Barry 1996, Marty 2004, Pyke and Marty 2005, Middleton et al. 2004, Collins et al. 1998, Hayes and Holl 2003). These wetlands exhibited greater biodiversity and native annual forb species richness (Marty 2004, Pyke and Marty 2005, Middleton et al. 2006), longer-lasting wetland hydrology (Marty 2004), and less thatch accumulation (Barry 1996) when compared to areas that completely removed cattle from the previously-grazed wetlands. Complete removal of the cattle from previously grazed areas led to shorter inundation of wetlands (Barry 1996, Marty 2004, Pyke and Marty 2005), accumulation of thatch (Marty 2004, Barry 1996), and reduced biodiversity (Collins et al. 1998, Middleton et al. 2006), accompanied by an increase in non-native annual forbs and grasses (Barry 1996) or encroachment of shrubs (Middleton et al. 2006) within and along the margin of the wetlands.

These studies also recommend considering the effects of season of grazing and grazing intensity when creating a grazing plan as well as monitoring plant species, residual dry matter, and utilization to adjust this plan to make progress towards the landscape goals (Barry 1996, Hayes and Holl 2003, Collins et al. 1998, Marty 2004, Pyke and Marty 2005). The grazing plan developed by WRA (See Exhibit D-6 of the BEI), as well as the adaptive management actions described in the LTMP were modelled to account for these recommended management practices and considered the amount of cattle, vegetation, dry matter, and seasonality, among many other factors, when designing the grazing plan. As supported by the publications listed above, these seasonal wetlands dominated by annual species can benefit from grazing when the grazing is managed in a way that takes these factors into consideration. If degradation is observed as a result of the cattle grazing in preservation areas, adjustments will be made to the LTMP and IMP, as needed, to correct these impacts.

5.2 Summary of the Elizabeth Lake Mitigation Activities

Hydrologic and geomorphological studies (Appendix B) were conducted by VA Consulting, Inc. (VA Consulting) to determine the feasibility and appropriate methodology for restoring the dynamic hydrological processes of historic alluvial floodplains on the Elizabeth Lake Bank Property. Based on these studies, conceptual restoration plans have been designed to remove impoundments from disturbed alluvial floodplains, and redirect flows from the deeply incised channels to the historic alluvial floodplain on the valley floor. The mitigation activities will involve earthwork, grading, and replanting of native alluvial scrub habitats and will result in the re-establishment of active alluvial floodplain habitat. After re-establishment, the active alluvial floodplain surfaces will be exposed to periodic flooding and sediment transport associated with flood events. Active channels will form naturally on the floodplain and will migrate across the surface with subsequent flood events. This regular pattern of hydrologic influence and disturbance will create suitable habitat for alluvial floodplain species and will deter the establishment of non-alluvial floodplain species such as grasses and mature scrub species. The species considered for active alluvial floodplain surface re-establishment are detailed in the development plans for each individual area in Part II – Part VI below.

There are five alluvial floodplain restoration sites in the Elizabeth Lake Bank Property. Lucky Canyon, a small alluvial floodplain along the western margin of the Elizabeth Lake Bank Property, will not be restored as it is not feasible due to its high cost and property boundary constraints. Detailed explanations of the development plans for each restoration site are included in Part V and Part VI including seed mixes, plan view diagrams, representative cross-sections, geographic coordinates, mitigation type, and mitigation acreage per credit type.

5.2.1 Fire-Related Mitigation Activities

In response to the effects of the Powerhouse Fire, sensitive habitats in Elizabeth Lake will be monitored and managed for weeds and other degradations to these habitats. These actions will include monitoring for post-fire conditions, weed management, and replanting of native species by seed or container plants. Monitoring for cover of native species and cover of non-native species will follow the same monitoring procedures as described in the vegetation monitoring portions of Part I-Section 6.0. The results of monitoring will determine any treatments necessary for rehabilitation areas.

Weed treatment will occur through application of herbicides, mechanical removal and/or hand removal, as appropriate for the target weeds requiring treatment. Mechanical and hand removal will be favored in areas within aquatic resources where herbicides are generally restricted and often contribute to non-target effects. The Material Safety Data Sheet (MSDS) recommendations will be followed for all herbicides used.

5.3 Summary of the Petersen Ranch Mitigation Activities

Mitigation activities have been designed to remove berms that prevent water movement, raise the base elevation of ponds that act as hydrologic sinks within the wetland complex, and re-establish natural hydrologic patterns to the restoration sites in the Petersen Ranch Bank Property. The mitigation activities will involve earthwork, and planting of native wetland and riparian species. Many studies and surveys were conducted in the Petersen Ranch Bank Property to support the restoration planning efforts, including a review of historic aerial imagery, topographic maps, and hydrology studies. A report detailing the hydrology studies in the Petersen Ranch Bank Property is included in Exhibit K of the BEI. Detailed explanations of the Development Plans for each Restoration Site are included in Part II – Part IV including seed mixes, plan view diagrams, representative cross-sections, geographic coordinates, mitigation type, and mitigation acreage per credit type.

6.0 PERFORMANCE MONITORING AND STANDARDS

Monitoring the established, re-established, rehabilitated, and enhanced habitats will occur annually throughout the performance monitoring period beginning the first spring following completion of the mitigation activities. Data will be collected in each monitoring year during spring or early summer to assess native vegetation. The performance monitoring methods and final Performance Standards are summarized below. More details on the Performance Standards for each Restoration Site are included in Part II – Part VI below.

Performance Standards include both CRAM-based Performance Standards and Uniform Performance Standards (UPS) measured using permanent transects. The USACE and the Lahontan RWQCB will base performance of each Restoration Site using the results of both CRAM and UPS, while CDFW will determine performance of each restoration site using data collected during UPS monitoring.

Performance monitoring will continue on an annual basis until the site has met all Performance Standards and the IRT has agreed in writing that the site has met all Performance Standards. These Performance Standards must all be met in consecutive order and while it is expected that these Performance Standards would be met over five consecutive years, due to uncertainties in the performance of the habitats, Performance Standards may be met earlier or later than the corresponding year. However, the Bank Properties will be monitored for a minimum of five years. Due to drought conditions, Performance Standards may not be met in the amount of time typically expected for mitigation banks under normal conditions. Therefore, if monitoring areas do not meet the Performance Standards within 5 years, monitoring will continue until the final year Performance Standard is met.

Additionally, monitoring will continue for at least two consecutive years following cessation of irrigation. All areas that were initially irrigated as part of the mitigation activities must be irrigation-free for two years prior to being deemed as meeting all success criteria.

Reference sites used for evaluation of performance standards will be monitored using the same sampling methodology that is used for the Bank habitats. In the fire-affected Elizabeth Lake Bank Property, performance standards are based on pre-fire vegetation data as a baseline for comparison since the vegetation site-wide is still recovering from the fire. Pre-fire vegetation data was collected in 2011 by WRA as part of the BRI surveys (WRA 2011), and is included in Exhibit H of the BEI. The location and orientation of transects and photo-monitoring locations for both Bank Properties are depicted in Figures 17 and 18.

6.1 Monitoring Methods

6.1.1 California Rapid Assessment Method (CRAM)

The performance of mitigation activities for 404 and Porter-Cologne credits will be monitored using the CRAM and the South Pacific Division's Uniform Performance Standards (UPS) to quantitatively assess the habitats' progress towards achieving the target scores identified in the CRAM report prepared by VCS Environmental (See Exhibit K-14 of the BEI). CRAM will be conducted within the same assessment areas (AAs) in years 3, 4, and 5 following implementation of the mitigation activities.

6.1.2 Uniform Performance Standards

Due to limitations in the way CRAM is scored, there is the potential for measurable improvements in the restored habitats to not be adequately reflected in the CRAM scores. To ensure changes in enhanced habitats are captured, and measured, UPS have been established for each CRAM metric. Mitigation actions will be considered as meeting their performance standards for the USACE and Lahontan RWQCB when they have met both the UPS and the target CRAM scores. If the Target CRAM score is not met for any metric during years 3, 4, and 5, the UPS may be used by the USACE/Lahontan RWQCB to determine if and to what degree the restored habitats are meeting the performance standards. Likewise, if the UPS is not met, the Target CRAM may be used. In such an event, the USACE would also make a case-by-case determination if full, partial, or no release of credits would be warranted. The Final Performance Standard will not be met until the target CRAM score has been achieved. For 1600 and CEQA credits, performance of the mitigation activities will be based solely on meeting the UPS. The methods used for measuring UPS are discussed in the following sections.

<u>Hydrology Monitoring Methods</u>

Hydrology will be monitored in wetlands through the use of data loggers installed in shallow groundwater monitoring wells (UPS #23). Data loggers will record the depth and duration of saturation or inundation at each well location. Manual observations to validate data will be conducted twice during the rainy season.

Hydrology and sediment transport in alluvial floodplain and stream restoration sites will be monitored through direct observation of Ordinary High Water Mark (OHWM) indicators along permanent transects (custom hydrologic UPS). Permanent transects will be located across the full width of the monitored resource, perpendicular to flow. Cross sections of the resource will be sketched and the location of hydrogeomorphic floodplain units will be identified following the procedures outlined in the *Updated Datasheet for the Identification of the Ordinary High Water mark (OHWM) in the Arid*

West Region of the Western United States (Curtis and Lichvar, 2010). Cross sections will indicate multi-thread or single thread channel formation (UPS #2). For each hydrogeomorphic floodplain unit sediment size, vegetation cover by strata, approximate stand age, and any observed OHWM indicators will be identified.

Vegetation Monitoring Methods

Vegetation monitoring in riparian and scrub habitats will be conducted utilizing permanent belt plot transects. This sampling method is based on a 50-meter by 2.5-meter belt plot (assessment occurs every 3 meters, and all species within 2.5 meters of the transect line are identified). The transect locations are depicted in Figures 17 and 18. Transects will be permanently marked in the field and GPS points recorded so that the same transects will be sampled in subsequent years.

Vegetation will be monitored for plant survivorship and cover of native and non-native species within each stratum. These results will be used to determine the species richness, cover of natives, and cover of invasives, for each Restoration Site based on the Performance Standard requirements described below.

Plant survivorship will be documented by counting the number of living container stock plantings for each woody species within each planting area. Plant survivorship estimates will only occur in riparian and shrub plantings; due to their growth forms, it is not feasible to count individual herbaceous plants. Health and condition of container stock will also be noted. Each species observed within 2.5 meters of the transect will be qualitatively assessed for general plant health along each of the transect locations. A qualitative health status description would be assigned to each species that includes such indicators as yellowing, leaf drop, limb sacrifice, live/dead, declining, etc. Other relevant general observations of the transect locations would be noted to describe the overall status of the vegetation community (e.g. phenology, etc.). Applicable performance standards, including relative and absolute cover and species richness measurements, will be calculated from the transect data.

Vegetation monitoring in herbaceous habitats (wetlands) will be conducted utilizing the quadrat transect method. This sampling method is based on a 50-meter main transect bisecting the wetland planting area. Quadrats will be placed every 3 meters along the main transect with the first quadrat located 1-3 meters, determined by a random number chart, from the wetland edge. Plant species and coverage will be measured using percent cover classes within a 0.5 meter squared quadrat. This data will then be examined to assess whether vegetation coverage meets the performance criteria.

In addition to assessing coverage using transects, the wetland will be traversed on foot and areas where dead patches of vegetation, or other indicators of an unsuccessful establishment, are observed will be noted on field maps or using GPS to direct replanting efforts for these areas.

6.1.3 Photo-Documentation

Visual records will be used to document changes in the Bank Property during the monitoring period. Photo-point monitoring will be used to document the project including pre-construction, post-construction, initial planting, and annual monitoring events. Photo-points will be established prior to implementation of mitigation activities and used throughout the monitoring period to create consistent photographic documentation of the changes within the Bank Property. Additionally, photo-points will be established in representative upland preservation areas to monitor changes in preserved habitats that may trigger management actions including shrub encroachment, weed infestation, and other management considerations. Photo-point locations will be recorded using a GPS handheld Trimble and mapped to indicate the location and direction of the photo-point. A map will be provided in the annual reports that will show the location and direction of each photo-point. The proposed photo-point locations are indicated in Figures 17 and 18.

6.1.4 Delineation Survey and Report Update

A site-wide delineation will be conducted in Year 3 and Year 5 (Final Year) of the performance monitoring period. The delineation will cover each established phase of the Bank and will include an updated delineation report, which will be reviewed and approved by the IRT. The results of the delineation will be used to determine the amount of successful aquatic restoration implemented on the Bank Properties. The IRT will use this delineation to adjust the amount of credits generated by the Bank, up or down, to reflect the successful acreage amount.

7.0 RESTORATION MAINTENANCE

Maintenance activities specific to the restoration actions in the Bank Properties are described in this section. These actions are expected to be required to ensure the restoration sites meet their performance standards.

7.1 Container Planting Monitoring and Replacement

Container plants will be monitored once at the end of the planting contractor's "guarantee period" (the 90 to 120 day period in which the contractor is required to replace any plantings that die or are in poor condition) to determine if any container plants have failed to become established and to map any plants in need of replacement. After the guarantee period has ended, container plants will be monitored once every 30-60 days for 2-3 years following planting. Monitoring will occur as a walk through inspection for plant vigor and plant health. If no problems appear to exist with the irrigation system, plants expressing signs of desiccation and critical wilt will be replaced. If irrigation is malfunctioning, the system will be fixed. If irrigation is repaired and the plants continue to exhibit signs of desiccation following the repair or replacement of the irrigation system, then the plants will be replaced.

In addition to plant health and vigor, monitoring of planting cages, tree tubes and pests will also be conducted during this walk through. Any cages or tree tubes in need of replacement will be replaced within 90-days. If large colonies of pests are seen on the container plants, the pests will be treated to prevent infestation.

7.2 Irrigation System Management

Irrigation systems will be monitored in planting areas during the plant establishment period. Plant establishment periods are typically 2-3 years for woody plants and 3 months for herbaceous plants. If drip irrigation systems are impaired, broken, or functioning improperly, they will be repaired or replaced in a timely manner to ensure successful irrigation and plant establishment. Monitoring will occur as a walk through inspection of irrigated areas once every 30-60 days. Irrigation systems will be turned on and irrigation emitters will be inspected for visual evidence of water flow. If used, Driwater® gel will be replaced every 40 to 90 days, as recommended by the manufacturer's instructions for use.

7.3 Weed Monitoring and Treatment

Weeds will be monitored annually by qualified staff as part of the Performance Monitoring described in Section 6.1. As needed, plantings will have additional mulch placed around their base to provide protection from weed encroachment. Invasive weeds rated "High" by Cal-IPC will be mapped and treated as soon as possible (based on the appropriate timing and phenology of the invasive species) to prevent further infestation of the Bank Properties. Dense populations of invasives that are not rated "High" may also be treated, if determined necessary to ensure performance standards are met.

7.4 Erosion Monitoring and Control

Graded areas and water/gradient control structures discussed in Part VI section 1.2, and Part VII sections 4.2 and 5.2 will be monitored for evidence of erosion or instability after large rain events during the first two years after construction, or until vegetation has become well established. As needed, additional erosion control measures may be installed including straw wattles, silt fencing, jute netting or reseeding with a native erosion control mix. If water/grade control structures are observed to show signs of unexpected erosion or instability, they will be immediately inspected by a qualified hydrologist or landscape architect and any needed remedial actions will be implemented and the IRT notified.

7.5 Maintenance of Restoration Infrastructure

Infrastructure will be periodically monitored for required repairs. Maintenance of the proposed improvements may include the occasional replacement of a dislodged stone from proposed rock and riprap lining of berms, channels, and outlets; repairs to roadway improvements required due to vehicular traffic damage; and crack repair to lined collector channels. Localized rutting that appears due to an uncontrolled loss of vegetative material by natural causes will be addressed by replacement of such vegetation loss. Cattle exclusion fencing will be repaired as necessary by replacing posts, wire, and/or gates.

8.0 AVOIDANCE AND MINIMIZATION MEASURES

8.1 General Avoidance and Minimization Measures

Avoidance and minimization measures will be implemented as part of development activities in areas in which restoration is taking place to avoid unnecessary impacts to sensitive biological and cultural resources in the Bank Property in the course of carrying out the development plan. These may include, and are not limited to, avoidance of the breeding bird season, establishment and use of best management practices (BMPs), assigning construction monitors, pre-construction bird surveys, and educating construction personal on special-status species and sensitive habitats in the Bank Property.

The avoidance and minimization measures implemented will include all of the avoidance and minimization measures required under CEQA and regulatory permits, and will be finalized by the regulatory agencies at the time of permit application and approval. The avoidance and minimization measures that may be required under these permits include:

- Construction vehicle access will utilize existing paved roads and service roads to the maximum extent possible.
- All construction staging and vehicle maintenance, staging, storage and dispensing of fuel will occur in designated upland areas. These upland areas are located in such a manner as to prevent any runoff entering jurisdictional waters.
- Grading activities will preserve existing, mature riparian habitat to the extent feasible.
- Vegetation will not be removed or otherwise disturbed on the project site from March 1 to September 1 to avoid impacts to breeding/nesting birds.
- Temporary fencing will be installed around existing habitat to be preserved prior to construction.
- No material (e.g., litter, debris, trash, etc.) will be deposited within sensitive habitat areas designated by the project biologist, temporary fencing, or other appropriate markers.
- Concrete will not be placed in Waters of the U.S. or Waters of the State when water is flowing.
- A biological monitor will be present on site during all grubbing and clearing of vegetation to ensure that these activities remain within the project footprint.
- If nesting birds are present during construction and the biological monitor believes that a narrower buffer is warranted, the biological monitor will coordinate with CDFW to determine a revised protocol.
- Preconstruction surveys for Migratory Bird Treaty Act (MBTA) will avoid impacts to CESA-listed species that have the potential to occur on on-site including Swainson's hawk, western yellowbilled cuckoo, southwestern willow flycatcher, and least Bell's vireo.

- Sediment control and soil stabilization BMPs will be implemented in accordance with a site-specific Storm Water Pollution Prevention Plan. The structural and non-structural BMPs may include:
    - Avoidance of grading during periods of rain;
    - Limiting the size of the disturbance;
    - Sediment barriers (e.g., fiber rolls); and
    - Revegetation of the disturbed areas.
- Compliance with the issued National Pollution Discharge Elimination System (NPDES) permit Construction vehicle access will utilize existing paved roads and service roads to the maximum extent possible.

9.0 MONITORING

9.1 Monitoring Activities in Enhancement Areas

Enhancement areas will monitored for the biological Performance Standards. Performance Standards are described below and summarized in Tables 9 and 10. Enhancement areas include some habitats that will result in 404 credits as well as 1600 credits, and some areas that will only result in 1600 credit. As such, performance will be monitored using two different methods; CRAM and permanent transects (UPS), as discussed in the Sections 6.1.1 and 6.1.2, will both be used to determine performance for 404 credits, and permanent transects will be used to determine performance for 1600 credits.

9.1.1 CRAM Performance Standards

CRAM will be conducted within enhancement areas of Elizabeth Lake and Petersen Ranch including those areas that will experience post-fire management or cattle exclusion restoration actions. For Elizabeth Lake, AAs #1, #6, #7, and #12 and #14 (Figure 17) will be monitored in years 3, 4, and 5 following implementation of the mitigation activities to demonstrate improvement of the functional condition of the resources affected by the post-fire enhancement activities. For each AA, the same CRAM module will be used that was used for determining baseline conditions. Target CRAM scores have been determined based on baseline conditions of the resources to be restored, analysis of the metrics that could be expected to improve as a result of the mitigation activities, and comparison with on-site resources. Because aquatic resources associated with each AA has varying limitations including proximity to permanent unnatural breaks in landscape or buffer and have anthropogenic modifications to hydrology that cannot be changed through enhancement activities, AAs have separate performance standards established with feasible performance standards for each attribute. Tables 9a-9e below contains the performance standards for Elizabeth Lake post-fire management enhancement AAs and Table 10 summarizes the performance standard for cattle exclusion enhancement AAs at Petersen Ranch.

Table 9a. CRAM Performance Standard for Post-Fire Management Enhancement AA #1 at Elizabeth Lake

Metric/Submetric	Year 1	Year 2	Year 3	Year 4	Year 5	Final
Buffer and Landscape Context	NA	NA	58	58	58	58
Hydrology	NA	NA	42	42	42	42
Physical Structure	NA	NA	38	38	38	38
Biotic Structure	NA	NA	36	61	64	64
Overall	NA	NA	43	50	51	51

Table 9b. CRAM Performance Standard for Post-Fire Management Enhancement AA #6 at Elizabeth Lake

Metric/Submetric	Year 1	Year 2	Year 3	Year 4	Year 5	Final
Buffer and Landscape Context	NA	NA	92	92	92	92
Hydrology	NA	NA	83	83	83	83
Physical Structure	NA	NA	38	38	38	38
Biotic Structure	NA	NA	31	56	58	58
Overall	NA	NA	61	67	68	68

Table 9c. CRAM Performance Standard for Post-Fire Management Enhancement AA #7 at Elizabeth Lake

Metric/Submetric	Year 1	Year 2	Year 3	Year 4	Year 5	Final
Buffer and Landscape Context	NA	NA	79	79	79	79
Hydrology	NA	NA	92	92	92	92
Physical Structure	NA	NA	50	50	50	50
Biotic Structure	NA	NA	56	78	81	81
Overall	NA	NA	70	75	76	76

Table 9d. CRAM Performance Standard for Post-Fire Management Enhancement AA #12 at Elizabeth Lake

Metric/Submetric	Year 1	Year 2	Year 3	Year 4	Year 5	Final
Buffer and Landscape Context	NA	NA	67	67	67	67
Hydrology	NA	NA	41	41	41	41
Physical Structure	NA	NA	63	63	63	63
Biotic Structure	NA	NA	67	92	92	92
Overall	NA	NA	60	66	66	66

Table 9e. CRAM Performance Standard for Post-Fire Management Enhancement AA #14 at Elizabeth Lake

Metric/Submetric	Year 1	Year 2	Year 3	Year 4	Year 5	Final
Buffer and Landscape Context	NA	NA	92	92	92	92
Hydrology	NA	NA	92	92	92	92
Physical Structure	NA	NA	75	75	75	75
Biotic Structure	NA	NA	53	78	89	89
Overall	NA	NA	78	84	87	87

Table 10. CRAM Performance Standard for Cattle Exclusion Enhancement AA #11 at Petersen Ranch

Metric/Submetric	Year 1	Year 2	Year 3	Year 4	Year 5	Final
Buffer and Landscape Context	NA	NA	92	92	100	100
Hydrology	NA	NA	75	75	75	75
Physical Structure	NA	NA	63	63	63	63
Biotic Structure	NA	NA	81	97	100	100
Overall	NA	NA	78	82	85	85

9.1.2 Uniform Performance Standards

Uniform Performance Standards will be used to assess enhancement areas throughout the Bank Properties. Enhancement areas will be monitored along permanent transects 10, 11, and 12 in the Elizabeth Lake Property (Figure 17) and transects 17, 18, 19, and 25 in the Petersen Ranch Property (Figure 18) for measurable metrics that will demonstrate the success of the mitigation activities (Table 11). This monitoring will follow the vegetation monitoring methodology described in Section 6.1.2, which will assess the biological aspects of the habitat affected by the mitigation actions. The UPS are based on pre-fire vegetation data collected for the Elizabeth Lake Property in 2011 by WRA as part of the BRI surveys (WRA 2011). The percent cover and species richness, as shown in Table 11, were calculated using this pre-fire vegetation data as the target. The transects in the Petersen Ranch Property are located in similar vegetation alliances as Elizabeth Lake and therefore the targets are appropriate for all enhancement area transects.

Table 11. Uniform Performance Standard Requirements of Enhancement Areas

Type	Uniform Performance Standard	Year 1	Year 2	Year 3	Year 4	Year 5	Final
Biological:	*UPS #28 Dominance of Natives*	Cover of native species will be at least 20% absolute cover		Cover of native species will be at least 30% absolute cover		Cover of native species will be at least 60% absolute cover	
	UPS #29 Dominance of Exotics	Absolute cover of non-native, invasive species will be </= 10%.					
	UPS #31 Species Richness	Number of native species will be ≥ 9					

9.2 Monitoring Activities in Preservation Areas

Management and monitoring activities for preservation areas are described in the LTMP (Exhibit D-6 of the BEI) and will include various tasks such as scouting for weeds, managing invasive species infestations, and assessing for habitat degradation. The overall goal of long-term management is to foster the long term viability of the Bank Properties' Waters of the U.S., Waters of the State, covered species, and covered habitat. Routine monitoring and minor maintenance tasks are intended to assure the quality of the Bank Properties' biological resources in perpetuity.

Annual monitoring will assess the Bank's condition, degree of erosion, invasion of exotic or deleterious (e.g., thatch producing) species, water quality, fire hazard, Swainson's hawk presence and habitat quality, and/or other aspects that may warrant management actions. Monitoring activities will include monitoring established photo-point locations, noted in Parts II-VI. The objective of the LTMP is to conduct monitoring to identify any issues that arise, and use adaptive management to determine what actions might be appropriate. Those chosen to accomplish monitoring responsibilities will have the knowledge, training, and experience to accomplish monitoring responsibilities.

10.0 ADAPTIVE MANAGEMENT PLAN

The approach to the long-term management of the Bank Properties' biological resources is to conduct annual site examinations and monitor selected characteristics to determine the stability and trends of Waters of the State, sensitive vegetation communities, and special-status species' habitats.

The tasks provided in the IMP are not exhaustive and other, unforeseen, tasks may need to be implemented during the Interim Management Period on an as-needed basis. These tasks will be implemented following an adaptive management approach. Adaptive management means an approach to natural resource management that incorporates changes to management practices, including corrective actions as determined to be appropriate by the IRT in discussion with the Bank Sponsor and/or the Property Owner, as appropriate, based upon Bank annual report results and IRT review of overall Bank performance and compliance Adaptive management includes those activities necessary to address the effects of fire, flood, or other natural events. Before considering any adaptive management changes to the IMP or LTMP, the Bank Sponsor, in conjunction with the IRT will consider whether such actions will help ensure the continued viability of the Bank Properties' biological resources.

11.0 REMEDIAL ACTIONS

If monitoring indicates that any Remedial Actions are needed to maintain the Bank's covered habitats or to help ensure that the Performance Standards will be met, the Bank Sponsor will prepare an analysis of the cause(s) of failure and propose Remedial Actions for approval. The annual report shall identify and describe any Remedial Action proposed. As described in the BEI, the Signatory Agencies may require the Bank Sponsor to develop and implement a Remedial Action Plan to correct non-minor Remedial Actions. Examples of non-minor Remedial Actions may include ameliorating degradation caused by a natural event such as wildfire, flooding, or landslides; if a Remedial Action Plan is determined to be necessary, it will be submitted to the IRT as a hard copy and in editable electronic format within 60 days of the date of written notice from the Signatory Agencies.

Minor Remedial Actions such as fence repairs, irrigation line repairs, etc. will be conducted within 90 days of identification of the issue. If monitoring determines that the habitats are failing to meet the vegetation criteria, or are likely to fail, Remedial Actions may occur such as supplemental planting or seeding of native species, exotic species eradication, repair of infrastructure, or modifications to irrigation system will be conducted at appropriate times of the year with approval from the IRT. The Bank Sponsor will be responsible for reasonably funding the Remedial Actions necessary for successful completion of the establishment/re-establishment, rehabilitation, and enhancement effort.

12.0 REPORTING

Annual reports will discuss monitoring methodology and results will be submitted to the IRT by December 15 of each monitoring year, with the first annual report to be submitted following installation of restoration sites. The reports will contain items including, but not limited to, the following:

- All Performance Standards for the bank areas and reference sites for each agency,
- All transect data,
- All datasheets for UPS and CRAM scores,
- Figures with location and orientation of the transects,
- Color photographs from the established photo-points,
- Updated credits tracking table,
- A completed South Pacific Division USACE Mitigation Monitoring Form,
- Hydrology data, and
- Other relevant information.

These reports will assess the progress in meeting Performance Standards, and identify any problems with flooding, sedimentation, vandalism, and/or other general causes of poor survival or degradation. If necessary, recommendations to improve success in achieving Performance Standards will be made. A final report describing the performance of the restoration sites in meeting the success criteria, and success of any necessary Remedial Actions, will be prepared and submitted to the IRT at the end of the performance monitoring period. Habitat monitoring and reports will be prepared by qualified biologists with experience in habitat monitoring.

13.0 COMPLETION OF MITIGATION ACTIVITIES

13.1 Notification of Completion

Upon successfully meeting the Performance Standards in the restoration sites, thereby finalizing the mitigation monitoring for the Bank, a final report will be sent to the IRT and Grantee detailing the results of the final year of monitoring.

13.2 USACE, CDFW, and RWQCB Confirmation

Once the USACE, CDFW, and RWQCB has reviewed the final report and/or conducted a site visit, the USACE, CDFW, and RWQCB, in consultation with the USEPA, will each independently determine whether Bank mitigation activities have been successfully completed, and notify the Bank Sponsor in writing..

14.0 LONG-TERM MANAGEMENT

The areas of the Bank within established phases will be held under Conservation Easement into perpetuity. Southwestern Resource Management Association will be the Grantee and will be responsible for ensuring that the terms of the Conservation Easement are being met. Other long-Term management tasks will be the responsibility of the Property Owner and are detailed in the LTMP (Exhibit D-6 of the BEI).

15.0 AVOIDANCE OF CULTURAL RESOURCES

Three prehistoric items were located in Area A of the Petersen Ranch Bank Property, both of which are located in the western preservation area of Area A where no disturbance or restoration is planned. Two of these resources were isolated finds (Iso-1 and Iso-2). The third resource, a lithic scatter, is comprised of two mano fragments and a quartzite core (S-1). The areas where Iso-1, Iso-2, and S-1 were located are not subject to any activities associated with the Bank, are located far from roads, and are within areas subject only to preservation. Monitoring, weed management, and any other long-term or interim management activities in these areas are not expected to impact these resources.

If mitigation activities are ever proposed for these areas in future bank addendums, then a monitor shall be present during any ground disturbance within 50 feet of Iso-1, Iso-2, and S-1. The archaeological monitor shall work under the direct supervision of a qualified archaeologist who meets the Secretary of the Interior professional qualifications for prehistoric archaeology. If an archaeological deposit or any artifacts are discovered, then the archaeological monitor shall have the authority to temporarily halt or divert construction. The monitor shall quickly assess the nature and significance of the find and in consultation with the qualified archaeologist make further recommendations to the USACE for consideration and compliance with section 106 of the National Historic Preservation Act and to the State Historic Preservation Officer (SHPO). In the event of any discoveries during construction of either human remains, archeological deposits, or any other type of historic property, the USACE' Archeology Staff will be notified within 24 hours. Work in any area(s) where potential cultural resources are discovered will be suspended, and construction will not resume in that area until authorized by the USACE. If the project description changes then additional studies may be warranted. Under the current plans proposed in this Development Plan, no monitor is required.

Although cultural sites that are older than 50 years have been observed in the Elizabeth Lake Bank Property, including a reservoir, dam, buildings and a turkey enclosure associated with the Munz Ranch and Frakes homestead, and a distribution line from 1922, all of the building structures in the Elizabeth Lake Bank Property were destroyed in the Powerhouse fire. More information is included in the Cultural Report (Exhibit J of the BEI). None of the cultural sites within Area E of the Elizabeth Lake Bank Property warrant further protection.

If human remains are encountered during any activities associated with the bank, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of the origin and disposition of the remains pursuant to State Public Resources Code Section 5097.98. The County Coroner must be notified immediately if human remains are found.

16.0 SITE PROTECTION INSTRUMENT

The Bank will be protected through the recordation of a conservation easement. This conservation easement is provided in **Exhibit E-4 of the BEI.**

17.0 FINANCIAL ASSURANCES

The Bank Sponsor is responsible for providing financial assurances for the performance and completion of Bank construction, management, and monitoring in accordance with Section VI of the BEI. The financial assurances shall be held in accordance with Section VIII.E of the BEI. The Bank Sponsor shall notify each Signatory Agency in accordance with Section XII.K of the BEI upon furnishing each of the following financial assurances:

- Construction Security (**Exhibit C-2 of the BEI)**
- Performance Security **(Exhibit C-3 of the BEI)**
- Interim Management Security **(Exhibit D-1 of the BEI)**
- Endowment Fund **(Exhibit D-2 of the BEI)**

More information on each of these financial assurances is included in the BEI text and relevant exhibits of the BEI as listed above.

PART II. AREA A - PETERSEN RANCH BANK PROPERTY

Area A consists of the southwestern portion of the Petersen Ranch Bank Property and is approximately 1,386 acres. Area A contains many important ecological features including ephemeral stream, wetland, wetland riparian, non-wetland riparian, freshwater marsh, open water, alluvial floodplain, CEQA-sensitive, and Swainson's hawk foraging habitat. Area A contains two restoration sites, the Rift Valley Restoration Site and the Petersen Stream Restoration Site (Restoration Site #6). The Rift Valley Restoration Site includes predominantly wetland, wetland riparian, non-wetland riparian, and open water habitat associated with the mapped features identified as Lower Pond, Upper Pond, ponds A-G, and the Wetland Restoration Site, non-wetland riparian re-establishment areas, and select cattle exclusion areas (Figure 16). The Petersen Stream Restoration Site includes an alluvial floodplain and ephemeral stream in the far western portion of Area A. Additional enhancement actions will occur in Area A through cattle exclusion surrounding select wetland habitat. Various credits will be generated in Area A, including 404 credits, Porter-Cologne credits, 1600 credits, CESA credits, and CEQA credits. All resources in Area A that are not subject to mitigation activities through establishment/re-establishment, restoration, or enhancement activities will generate Preservation Credits.

1.0 RIFT VALLEY RESTORATION SITES

1.1 Existing Conditions within the Rift Valley Restoration Sites

The Rift Valley Restoration Site contains a large, seasonal wetland complex within the San Andreas Fault Rift Zone. This seasonal wetland complex is dominated by Mexican rush marsh, with isolated stands of willows, mulefat, and cottonwood, typically located on the fringes of pond features. Many large, deep irrigation ponds are scattered throughout this wetland complex. These ponds were historically filled by pumping water, but will not continue to provide open water habitat due to the cessation of pumping. The cessation of pumping has resulted in large patches of open ground dominated by non-native species without suitable natural hydrology to support open water features. Therefore, these ponds will be restored to wetland habitat, which natural hydrologic regimes will be able to support. This section describes the following restoration sites labelled in the Figure 19:

- Lower Pond
- Upper Pond
- Ponds A – G
- Wetland Restoration Site

Geographic coordinates for each of the restoration sites in Area A of the Petersen Ranch Bank Property are included in Figure 19.

1.2 Mitigation Activities within the Rift Valley Restoration Sites

Plan-view drawings of the mitigation activities in the Rift Valley Restoration Sites are included in Figure 20. Representative cross-sections are included in Figure 21.

1.2.1 Wetland Mitigation Activities (Ponds)

Ponds within the Rift Valley restoration sites were historically filled by pumping water, but will not continue to provide open water habitat due to the cessation of pumping. Therefore, these ponds, which are currently dominated by non-native species and large patches of open ground, will be restored to the wetland habitat that would naturally occur. Ponds (Lower Pond, Upper Pond, and Ponds A through G, see Figures 19-21) in The Petersen Ranch Bank Property will undergo three steps in the restoration process: (1) berms will be excavated, (2) soils from the excavated berms will be used to raise the base elevation of the pond bottoms and, (3) altered soils will be replanted with native, wetland/riparian vegetation. These mitigation actions will increase the surface area and functional condition of wetlands in currently degraded habitats.

In order to maintain structural diversity, grading will not create a flat, uniform surface. Instead, micro-topographic features will be created that will create pockets of hydrologic variation that will encourage biodiversity and habitat complexity. Habitat complexity will include areas of varying inundation and soil saturation depths, and may include smaller areas of open water or freshwater marsh habitat. Grading activities will preserve existing, mature riparian habitat. Topographic alterations beneath the dripline of riparian trees will be minimized to the extent feasible to avoid potential damage to the existing riparian species. Deep ponding areas within the dripline of riparian species will be largely unaltered to encourage small amounts of ponding near the riparian vegetation. This ponding will sustain the plants through dry periods. Planted vegetation will be chosen based on representative vegetation observed in healthy wetlands in the Petersen Ranch Bank Property and surrounding areas including a mix of annuals and perennials that easily establish. These include Mexican rush, western goldenrod (*Euthamia occidentalis),* red willow, and mulefat, amongst others (Table 12).

Initial revegetation will focus on utilizing rapidly establishing, perennial species. These include two rhizomatous species: Mexican rush and western goldenrod. The graded areas of the wetland will be re-established with a combination of plugs from these species and a seed mix of perennial and annual wetland plants known from wetlands in and adjacent to the Petersen Ranch Bank Property (Tables 12 and 13).

In some portions of the wetlands, riparian species may be planted to augment existing stands of riparian vegetation, or to encourage the development of a riparian fringe surrounding the wetland. Many of these species, including red willow and arroyo willow, will be propagated from pole cuttings. Willow species reproduce from cuttings easily as long as they have access to water sources. Pole cuttings will be at least four feet in height and inserted into the ground at a depth suitable for the cutting to access water or saturated soils. If feasible, materials from these pole cuttings will be salvaged from limbs removed in the Petersen Ranch Bank Property. Other riparian species including mulefat and Fremont cottonwood do not reliably reproduce from vegetative cuttings and will be planted from containers in areas with access to natural water sources. Irrigation may be used for the first two to three years to ensure successful establishment of the plantings. These activities constitute wetland and riparian re-establishment and rehabilitation.

Table 12. Wetland and Riparian Plant Palettes

Scientific Name	Common Name	Container Size / Type	Approximate On-center Spacing (feet)
Artemisia douglasiana	Mugwort	1 gallon	4
Baccharis salicifolia	Mulefat	1 gallon	10
Carex praegracilis	clustered field sedge	plug	1.5
Distichlis spicata	Saltgrass	plug	1.5
Eleocharis macrostachya	common spikerush	plug	1.5
Euthamia occidentalis	western goldenrod	4" pot	3
Juncus balticus	Baltic rush	plug	2
Juncus mexicanus	Mexican rush	plug	2
Mimulus guttatus	seep spring monkeyflower	4" pot	3
Populus fremontii	Fremont cottonwood	1 gallon	12
Salix laevigata	red willow	1 gallon / pole	10
Salix lasiolepis	arroyo willow	1 gallon / pole	10
Stachys albens	whitestem hedgenettle	4" pot	3

Table 13. Wetland and Riparian Seed Mix

Scientific Name	Common Name	Pure Live Seed (Lb./Acre)
Elymus condensatus	giant wild rye	4
Elymus elymoides	squirreltail	4
Elymus glaucus	blue wildrye	6
Festuca microstachys	small fescue	4
Heliotropium curassavicum	salt heliotrope	2
Hordeum brachyantherum	meadow barley	6
Poa secunda	blue grass	4
Solidago confinis	southern goldenrod	2
	TOTAL	**32**

1.2.2 Wetland Establishment (Wetland Restoration Site)

The mitigation activities in the Wetland Restoration Site (Figures 19-21) will vary slightly from the restoration of the ponds. The Wetland Restoration Site currently contains a narrowed portion of the greater wetland complex. The wetland in this area will be widened within the Wetland Restoration Site through excavation of the soil at the margins of the existing wetlands. The mitigation activities in this Wetland Restoration Site will include excavation, grading, and replanting to increase the size

of the wetland complex in this area. The soil excavated from this wetland will be used to supplement the previously described mitigation activities to raise the base elevations of the restored ponds. These activities constitute wetland establishment.

1.2.3 Cattle Exclusion Activities

Aquatic resources within the main rift valley will be afforded further protections by exclusion of cattle from these areas. These exclusion areas will include a minimum set-back buffer of 35 feet surrounding each aquatic resource. More information is included in Section 5.0 below.

1.3 Mitigation Types in the Rift Valley Restoration Sites

1.3.1 Seasonal Wetland Re-establishment

As stated previously, seasonal wetland re-establishment activities will include excavation of upland berms, re-grading after excavation, and replanting of native wetland species. Weed treatment will also occur in these areas during, and following, the monitoring period as part of the long-term management activities. In instances where ranch roads occur on these berms, the roads will be removed to reconnect upstream and downstream flows within the Rift Valley Wetland Complex. These actions will return the landscape to its natural topography and historic wetland condition. This will increase the area of wetland habitats and will also increase the function of surrounding wetland habitats. In addition to the activities described above, seasonal wetland re-establishment will include replanting with native species, weed monitoring, and weed management.

1.3.2 Seasonal Wetland Rehabilitation

Seasonal wetland rehabilitation would occur through conversion of degraded ponds to seasonal wetland habitats, reconnecting adjacent wetlands through the reconnection of surface and subsurface water flow, and the exclusion of cattle to create more natural topography, water storage, and increased flow, thereby restoring the historic functions of habitat, nutrient filtering, and hydrologic connectivity. These rehabilitation measures will increase the functionality of the system as a whole and will repair degraded seasonal wetland habitats to pre-disturbance conditions.

1.3.3 Wetland Riparian Rehabilitation

Riparian rehabilitation will be integrated with the seasonal wetland rehabilitation activities discussed above to encourage and sustain the long-term survival of mature riparian habitats that exist adjacent to, or within, the man made ponds (Lower Pond, Upper Pond, Ponds A-C, and Pond G).

Some of the riparian habitats in Area A of the Petersen Ranch Bank Property are located within, or adjacent to, large, deep, man-made ponds excavated in what was historically a seasonal wetland. Water was pumped into these ponds until 2010. Since pumping has ceased, the ponds have dried and are unlikely to continue supporting riparian habitat due to the decreased water levels resulting in smaller ponded areas that are often well beyond the dripline of riparian trees. As part of the seasonal wetland mitigation activities, the pond bottom elevations will be raised, but small, deep depressions will remain providing small open water areas beneath the drip-line of riparian species. Because of this, natural hydrologic processes are expected to be able to fill the small ponds and sustain them without pumping. Water will be able to concentrate in the small ponding areas and will be stored there for a duration long enough to naturally sustain the mature riparian habitat. This will lead to rehabilitation of these wetland riparian habitats since, currently and without pumping, they do not have access to semi-permanent water sources.

1.3.4 Non-Wetland Riparian Re-Establishment

Non-Wetland Riparian Re-Establishment will occur adjacent to areas where riparian vegetation already occurs in small pockets and where it is presumed that larger non-wetland riparian habitats once existed based on hydrologic regimes in the area. These mitigation types will be the result of non-wetland riparian habitats planted in these areas.

1.3.5 Non-Wetland Riparian/Riparian Buffer Rehabilitation

Non-wetland riparian rehabilitation will occur in conjunction with alluvial floodplain and seasonal wetland re-establishment and rehabilitation measures, including cattle exclusion that will allow natural colonization of wetland riparian species and rehabilitation of non-wetland riparian habitats. Additionally, non-wetland riparian rehabilitation will occur when hydric function is returned/improved in non-wetland riparian areas. This will be, in part, due to increased hydric inputs from rehabilitated and re-established alluvial floodplain and wetland surfaces.

1.3.6 Upland Buffer Rehabilitation

Upland buffer rehabilitation will occur in adjacent upland areas where grading, planting, and cattle exclusion will restore upland habitats to high quality native plant communities.

1.4 Credits in the Rift Valley Restoration Sites

Ex. 4 CBI

Ex. 4 CBI

1.5 Performance Monitoring and Standards for the Rift Valley Restoration Sites

The performance of the Rift Valley restoration sites will be based on monitoring for appropriate hydrological, physical, and biological properties of the rehabilitation and reestablishment areas. This performance standard section will be used to determine the performance standards for the Lower Pond, Upper Pond, Pond A through Pond G, and the Wetland Restoration Site described in Figures 19 and 20. The pond and wetland restoration will result in 404 credits as well as 1600 credits, and performance will be monitored using two different methods: CRAM and permanent transects (UPS) as discussed in the methods in Part I – Section 6.1. The CRAM assessment areas and transects are depicted in Figure 22.

1.5.1 CRAM Performance Standards

AAs #2, #13, #14, and #17 are located within the Rift Valley restoration sites in areas that will not be directly subjected to grading or planting activities (Figure 22). These AAs will experience improved hydrology from upstream restoration sites as well as benefits resulting from the exclusion of livestock from the wetland complex. Following restoration these AAs are expected to be representative of the type and quality of habitats that are being created at the pond and wetland restoration sites. Therefore, the predicted CRAM scores for AAs #2, #13, #14 and #17 were used to set the target CRAM score for the restoration sites. The target CRAM scores for these AAs following restoration are 75, 77, 75, and 80 respectively. Based on these scores AAs #3, #4, #7, #8, #10, #12, #15 and #16 should have target overall CRAM scores of 75 or greater (Table 15).

Table 15. CRAM Performance Standard for AAs in the Rift Valley Restoration Sites

Metric/ Submetric	Year 1	Year 2	Year 3	Year 4	Year 5	Final
Buffer and Landscape Context	NA	NA	75	75	75	75
Hydrology	NA	NA	83	83	83	83
Physical Structure	NA	NA	50	55	63	63
Biotic Structure	NA	NA	67	72	78	78
Overall	NA	NA	67	72	75	75

1.5.2 Uniform Performance Standards

The Rift Valley restoration sites will be monitored for measurable metrics that will demonstrate the success of the mitigation activities (Table 16). These performance standards will be monitored along permanent transects (Figure 22) and will assess the physical, hydrological, and biological aspects of the habitat affected by the mitigation actions. Transects 1, 7, 9, 13, and 15 are placed in representative areas in the wetland complex that will not be subject to grading or planting but will receive benefits from the restored hydrologic regime and exclusion of cattle. Following restoration, these transects are expected to represent the type and quality of intact wetland habitat that will be rehabilitated and re-established within the restored ponds and wetlands. These transects will act as reference sites for transects 3, 4, 5, 6, 8, 10, 11, 12, 14, 16, 20 and 21.

Table 16. UPS for the Rift Valley Restoration Sites

Type	Uniform Performance Standard	Year 1	Year 2	Year 3	Year 4	Year 5	Final
Physical:	*UPS #20*	Must contain ≥25% of the structural patch types found at the selected reference site	Must contain ≥50% of the structural patch types found at the selected reference site		Must contain ≥75% of the structural patch types found at the selected reference site		Must contain ≥90% of the structural patch types found at the selected reference site
Hydrologic:	*UPS #23*	The Bank Sponsor shall ensure that the depth to groundwater is within the range of reference wetland conditions.					
Biological:	*UPS #28 Dominance of Natives*	Absolute cover of native species will be at least 10% of the cover observed at the reference site	Absolute cover of native species will be at least 25% of the cover observed at the reference site	Absolute cover of native species will be at least 50% of the cover observed at the reference site	Absolute cover of native species will be at least 60% of the cover observed at the reference site		Absolute cover of native species will be at least 75% of the cover observed at the reference site
	UPS #29 Dominance of Exotics	Relative cover of non-native, invasive species will be ≤ the reference site.					
	UPS #31 Species Richness	Number of native species in planting areas ≥ 75% of the reference site					

2.0 PETERSEN STREAM RESTORATION SITE (RESTORATION SITE #6)

2.1 Existing Conditions within the Petersen Stream Restoration Site

The Petersen Stream Restoration Site includes an ephemeral stream located on the western edge of the Petersen Ranch Bank Property. This drainage has been historically manipulated due to groundwork and flood-control practices by previous land-owners that have resulted in berms and linear channel morphology. The stream is lined with riparian vegetation including willows, mulefat, and Parish's sagebrush (*Artemisia tridentata ssp. parishii*). The location of the Petersen Stream Restoration Site is depicted in Figure 19.

2.2 Mitigation Activities within the Petersen Stream Restoration Site

2.2.1 Stream Mitigation Activities

Stream rehabilitation actions will involve grading the stream to widen the channel, and remove the confining berm that forms the east bank to encourage overflow into adjacent wetlands during high flow events. The results of these mitigation activities will cause floodwaters from this stream to spill into the restored wetland complexes thereby attenuating downstream peak flows, improving water quality, and improving hydrologic connectivity with the floodplain. Planting of riparian species will also occur along the banks and in the restored floodplain. The active alluvial floodplain surface will be planted with the species described in Table 17 below. Weeds will be monitored and managed. Plan-view drawings of the mitigation activities in the Petersen Stream Restoration Site are included in Figure 23. Representative cross-sections are included in Figure 24.

2.2.2 Cattle Exclusion Activities

In addition to the mitigation activities described above, the Petersen Stream Restoration Site will be afforded further protections by exclusion of cattle from these areas, as described in Part I – Section 5.1.

2.3 Mitigation Types in the Petersen Stream Restoration Site

2.3.1 Alluvial Floodplain Re-establishment

Alluvial floodplain re-establishment mitigation types will be generated through restoration of natural topography and hydrology in the adjacent stream. These actions will return the landscape to its natural topography and historic alluvial floodplain condition. This will increase the area of alluvial floodplain habitats but will also increase the functions of surrounding aquatic habitats including the downstream Rift Valley Wetland Complex. 404 Re-establishment Credits associated with the alluvial floodplains are estimated based on the critical flow width that is expected to occur during a 10-year flood event. The remainder of the fan surface will initially provide credits based on the re-establishment of riparian buffer.

2.3.2 Alluvial Floodplain Enhancement

Alluvial floodplain enhancement will occur in conjunction with the ephemeral stream rehabilitation measures. The measures described below in Section 2.3.3 will increase the hydric inputs to the alluvial floodplain habitat adjacent to the Petersen Stream Restoration Site, which will enhance existing alluvial floodplain habitat.

2.3.3 Ephemeral Stream Rehabilitation

Stream rehabilitation will include replanting with native species, weed monitoring, and weed management in addition to grading. This stream will be reconnected to its floodplain through removal of the berm, thereby reducing downstream flood pressures and improving water quality and hydrologic connectivity (Figure 23 and Figure 24).

2.3.4 Non-Wetland Riparian Re-Establishment

Non-Wetland riparian re-establishment will occur adjacent to the restored stream. This mitigation type will result from planting native riparian plant species.

Table 17. Active Alluvial Floodplain Surface Seed Mix for the Petersen Stream Restoration Site

Scientific Name	Species Name	Approx. Application Rate (PLS (Lb.)/Acre)
Artemisia dracunculus[1]	wild tarragon	1.0
Artemisia tridentata ssp. parishii	Parish's sagebrush	1.0
Bromus ciliatus[1]	fringed brome	2.0
Elymus condensatus	giant wild rye	2.0
Elymus elymoides	bottlebrush squirreltail	2.0
Elymus trachycaulus	slender wheatgrass	2.0
Eriodictyon crassifolium	thick leaf yerba santa	3.0
Eriogonum fasciculatum	California buckwheat	2.0
Festuca microstachys[1]	small fescue	4.0
Lupinus truncatus	collared annual lupine	3.0
Hordeum brachyantherum	meadow barley	4.0
Melica imperfecta	smallflower melic	2.0
Muhlenbergia rigens	deergrass	2.0
Poa secunda	pine bluegrass	4.0
Salvia apiana	white sage	1.0
Salvia columbariae	chia sage	1.0
Stipa pulchra	purple needlegrass	4.0
	TOTAL	**40.0**

[1]*Species may not be available for seeding at large scale. Composition and application rate is subject to change based on availability and cost feasibility.*

2.3.5 Non-Wetland Riparian Rehabilitation

Non-wetland riparian rehabilitation will occur in existing non-wetland riparian habitats adjacent to the restored stream. Non-wetland riparian rehabilitation will occur when hydric function is returned/improved and existing non-wetland riparian areas are planted with supplemental riparian plants.

2.3.6 Upland Buffer Rehabilitation

Upland buffer rehabilitation will occur in upland areas adjacent to Petersen Stream Restoration Site where grading, planting, and cattle exclusion will restore upland habitats to high quality native plant communities.

2.4 Credits in the Petersen Stream Restoration Site

Ex. 4 CBI

2.5 Performance Monitoring and Standards for Petersen Stream Restoration Site

The performance of the Petersen Stream Restoration Site will be based on monitoring for appropriate hydrological, physical and biological properties of the re-established, rehabilitated, and enhanced areas in the stream and alluvial floodplain on the western side of the Petersen Ranch Bank Property. The Petersen Stream Restoration Site will result in 404 credits as well as 1600 credits, and performance will be monitored using two different methods: CRAM and permanent transects (UPS) as discussed in the methods in Part I – Section 6.1.

2.5.1 CRAM Performance Standards

AA #1 is located within the existing stream channel for the Petersen Stream Restoration Site (Figure 17). Following restoration, AAs #9 and #10 from Elizabeth Lake (Figure 17), described in Part VI, Section 1.6.1, are expected to be characteristic of typical stream and alluvial fan habitat in the restoration site. As such, pre-fire vegetation data from AAs #9 and #10 at Elizabeth Lake will provide the basis for the UPS at AA #1. Given that the post-fire restoration CRAM score at AA #9 is expected to be 85, and the CRAM score at AA #10 is expected to be 85, the logical target overall CRAM score for the Petersen Stream Restoration Site would be 85 (Table 19). However, because the Petersen Stream Restoration Site occurs adjacent to non-buffer areas and has nearby modified hydrology, the capacity for improvement in the attribute scores for buffer and landscape context and hydrology are limited. Therefore, CRAM Performance Standards for the Petersen Stream Restoration Site are based on what the Petersen Stream Restoration Site can reasonably achieve given its landscape position and nearby permanent anthropogenic modifications to hydrology, with physical and biotic structure attributes expected to achieve scores of reference site conditions. The Petersen Stream Restoration Site is expected to have a final score of 83 points for buffer and landscape context and 67 points for hydrology, which deviate from AAs #9 and #10, consequently resulting in an overall final CRAM score of 76.

Table 19. CRAM Performance Standard for the Petersen Stream Restoration Site

Metric/Submetric	Year 1	Year 2	Year 3	Year 4	Year 5	Final
Buffer and Landscape Context	NA	NA	83	83	83	83
Hydrology	NA	NA	67	67	67	67
Physical Structure	NA	NA	63	70	75	75
Biotic Structure	NA	NA	61	70	78	78
Overall	NA	NA	69	73	76	76

2.5.2 Uniform Performance Standards

The Petersen Stream Restoration Site will be monitored for measurable metrics that will demonstrate the success of the mitigation activities (Table 20). These performance standards will be monitored along a permanent transect (Figure 22) and will assess the physical, hydrological, and biological aspects of the habitat affected by the mitigation actions. Transect 2 on the Petersen Ranch Bank Property traverses a portion of the stream that will be widened. The UPS will be based on pre-fire vegetation data because the vegetation site-wide is still recovering from the fire. Pre-fire vegetation data was collected in 2011 by WRA as part of the BRI surveys (WRA 2011), and is included in Exhibit H of the BEI. The percent cover for vegetation, as described in Table 20, was calculated using this pre-fire vegetation data as a reference site, in accordance with UPS protocol. As such, Elizabeth Lake Transect 2 pre-fire vegetation data will act as the reference standard for Petersen Ranch Transect 2.

Table 20. Uniform Performance Standards for the Petersen Stream Restoration Site

Type	Uniform Performance Standard	Year 1	Year 2	Year 3	Year 4	Year 5	Final
Physical:	*UPS #2*	The mitigation retains or increases stream stability and does not cause site, upstream, or downstream excessive erosion or aggradation. Specifically: Overall channel form should not indicate a consistent trajectory indicating a transition from a multi-thread to a single thread channel form.					
Hydrologic:	*Custom*	Field indicators of Ordinary High Water and distinct hydrogeomorphic floodplain units will be documented within the alluvial floodplain.					
Biological[1]:	*UPS #28 Dominance of Natives*	Cover of native species will be at least 5% absolute cover	Cover of native species will be at least 10% absolute cover	Cover of native species will be at least 20% absolute cover	Cover of native species will be at least 30% absolute cover	Cover of native species will be at least 50% absolute cover	Cover of native species will be at least 50% absolute cover
	UPS #29 Dominance of Exotics[2]	Relative cover of non-native, invasive species will be 0%.					
	UPS #31 Species Richness	Number of native species in planting areas ≥ 14 species					

1. Percent cover estimates were calculated using UPS standards and pre-fire vegetation data from reference sites within the Elizabeth Lake Bank Property. See Exhibit H of the BEI for these data.
2. Excluding non-native annual grasses listed as highly invasive Cal-IPC (2006) , which will be ≤ 10% cover.

3.0 OTHER MITIGATION ACTIVITIES

3.1 Mitigation Activities Outside of the Restoration Areas

3.1.1 Cattle Exclusion

Cattle will be excluded from select portions of Area A (Figure 16), as described in Part I – Section 5.1.

3.1.2 Conservation Easement

A conservation easement will be established over the Bank Property, as described in Part I – Section 5.0.[2] All habitats will be managed in perpetuity to protect their functions and conditions.

---

2 Please see BEI Exhibit E-4, Conservation Easement, for a complete description of the area covered by the conservation easement.

3.2 Mitigation Types Outside of the Restoration Areas

3.2.1 Enhancement

Excluding cattle from select portions of Area A will result in enhancement of alluvial floodplain, ephemeral stream, freshwater marsh, open water, wetland riparian, seasonal wetland, and non-wetland riparian habitats.

3.2.2 Preservation

The conservation easement will result in preservation of all covered species and habitat types within Area A that are not associated with a restoration site or otherwise enhanced, and will preserve these resources in perpetuity.

3.3 Credits Generated Outside of the Restoration Areas

Ex. 4 CBI

Ex. 4 CBI

Ex. 4 CBI

PART III. AREA B - PETERSEN RANCH BANK PROPERTY

Area B consists of the northwestern portion of the Petersen Ranch Bank Property and is approximately 512 acres. Area B of the Petersen Ranch Bank Property contains steep, mountainous areas covered in dense chaparral, buckwheat scrub, and other scrubland communities with intermittent grassland habitats predominantly located on the less sloped portions of Area B. Many steep ephemeral streams occur in Area B, which are subject to flashy flows. Minimal invasive species are located within Area B. Non-native species that were located within this area were comprised predominantly of grasses, which are consistent with the surrounding lands and do not pose a management concern. Resources within Area B include ephemeral stream, non-wetland riparian, and upland habitats, the preservation of which will generate various credits, including Porter-Cologne credits, 1600 credits, CESA credits, and CEQA credits. No establishment, restoration, or enhancement activities will occur in Area B.

1.0 MITIGATION ACTIVITIES IN AREA B

A conservation easement will be established over the Bank Property, as described in Part I – Section 5.0. All habitats will be managed in perpetuity to protect their functions and conditions.

2.0 MITIGATION TYPES IN AREA B

The conservation easement will result in preservation of all covered species and habitat types within Area B, and will preserve these resources in perpetuity. Area B will be monitored using the established photo-points (shown in Figure 16).

3.0 CREDITS GENERATED IN AREA B

Preservation activities will generate Preservation Credits in Area B as shown in Table 39 and

Ex. 4 CBI

Ex. 4 CBI

PART IV. AREA C - PETERSEN RANCH BANK PROPERTY

Area C consists of the northeastern portion of the Petersen Ranch Bank Property and is approximately 658 acres. Area C of the Petersen Ranch Bank Property contains steep, mountainous areas covered in chaparral, buckwheat scrub, and other scrubland communities with intermittent grassland habitats predominantly located on the less sloped portions of Area C. Many steep ephemeral streams occur in Area C, which are subject to flashy flows. One stream and one wetland within Area C are considered to be creditable by the USACE. Minimal invasive species are located within Area C. Non-native species that were located within this area were comprised predominantly of grasses, which are consistent with the surrounding lands and do not pose a management concern. Resources within Area C include ephemeral stream, wetland riparian, seasonal wetland, non-wetland riparian, and upland habitats, the preservation of which will generate various credits, including Porter-Cologne credits, 1600 credits, CESA credits, and CEQA credits. No establishment, restoration, or enhancement activities will occur in Area C.

1.0 MITIGATION ACTIVITIES IN AREA C

A conservation easement will be established over the Bank Property, as described in Part I – Section 5.0. All habitats will be managed in perpetuity to protect their functions and conditions.

2.0 MITIGATION TYPES IN AREA C

The conservation easement will result in preservation of all covered species and habitat types within Area C, and will preserve these resources in perpetuity. Area C will be monitored using the established photo-points (shown in Figure 16).

3.0 CREDITS GENERATED IN AREA C

Ex. 4 CBI

Ex. 4 CBI

PART V. AREA D – PETERSEN RANCH BANK PROPERTY

Area D consists of the southwestern portion of the Petersen Ranch Bank Property and is approximately 1,233 acres. Area D of the Petersen Ranch Bank Property contains valleys, hills, and steep, mountainous areas. Portions of Area D are covered in chaparral, buckwheat scrub, and other scrubland communities. Grassland habitats in Area D are predominantly located in the valleys and southern hillsides. Many steep ephemeral streams occur in Area D, which are subject to flashy flows. Additionally, multiple seasonal wetlands, riparian habitats, and an excavated pond occur within Area D. Minimal invasive species are located within Area D. Non-native species that do occur include thistles that are predominantly located in the excavated pond. Additionally, non-native grasses were located within this area but these grasses are consistent with the surrounding lands and do not pose a management concern. Resources within Area D include ephemeral stream, open water, wetland riparian, seasonal wetland, non-wetland riparian, and upland habitats, the preservation and enhancement of which will generate various credits, including 404 credits, Porter-Cologne credits, 1600 credits, CESA credits, and CEQA credits. No establishment or restoration activities will occur in Area D.

1.0 MITIGATION ACTIVITIES IN AREA D

1.1 Cattle Exclusion

Cattle will be excluded from select portions of Area D (Figure 39), as described in Part I – Section 5.1.

1.2 Conservation Easement

A conservation easement will be established over the Bank Property, as described in Part I – Section 5.0. All habitats will be managed in perpetuity to protect their functions and conditions.

2.0 MITIGATION TYPES IN AREA D

2.1 Enhancement

Excluding cattle from select portions of Area A will result in enhancement of alluvial floodplain, ephemeral stream, freshwater marsh, open water, wetland riparian, seasonal wetland, and non-wetland riparian habitats.

2.2 Preservation

The conservation easement will result in preservation of all covered species and habitat types within Area D, and will preserve these resources in perpetuity. Additional long-term management actions will be conducted in the Bank Properties in association with preservation mitigation types. Area D will be monitored using the established photo-points (shown in Figure 16).

3.0 CREDITS GENERATED IN AREA D

Ex. 4 CBI

Ex. 4 CBI

Ex. 4 CBI

PART VI. AREA E - ELIZABETH LAKE BANK PROPERTY

Area E consists of the western portion of the Elizabeth Lake Bank Property and is approximately 160 acres. Area E contains many important ecological features including alluvial floodplain, ephemeral stream, freshwater marsh, open water, CEQA-sensitive, and Swainson's hawk foraging habitats. Area E includes the Munz Canyon Restoration Site, described in detail in Section 1.0. Munz Canyon restoration will involve the removal of an earthen berm to restore the alluvial floodplain (Figure 45). Lucky Canyon, a small alluvial floodplain along the western margin of Area E, will not be restored at this time due to its high cost and property boundary constraints. Additionally, an ephemeral stream flows from east to west, which historically connected to Elizabeth Lake, adjacent to Elizabeth Lake Road. The ANF is located due south of Area E and both the ANF and private land are located north of Area E.

The entire Elizabeth Lake Bank Property was burned in the Powerhouse Fire late May and early June of 2013 but recent surveys have found resprouting native shrubs and establishment of fire-colonizing species including chia (*Salvia columbariae*) and buckwheat (*Eriogonum sp.*). Various credits will be generated in Area E, including 404 credits, Porter-Cologne credits, 1600 credits, CESA credits, and CEQA credits.

1.0 MUNZ CANYON RESTORATION SITE (RESTORATION SITE #1)

1.1 Existing Conditions within the Restoration Site

Within Area E of the Elizabeth Lake Bank Property, mitigation activities will occur within one large alluvial floodplain known as Munz Canyon. Under existing conditions, Munz Canyon is blocked by an earthen berm that has been filled in on the upstream side by sediment and debris. This dam has failed, resulting in an eroded area that has created a deeply incised channel that follows the path of an old road cut. This breaching in the berm exists at its easterly abutment that allows flow and debris from Munz Canyon to flow directly to Elizabeth Lake. Prior to the construction of the berm, canyon flows proceeded in a northerly direction and deposited sediment and debris on to the downstream alluvial fan. As a result of the berm's construction, and the breach that has formed, the downstream alluvial fan is presently inactive.

Substrates within the alluvial floodplains vary from gravel to sand. Vegetation communities in alluvial fans are variable depending on the frequency of flow, disturbance, and topographic position (i.e., low-flow channel, active floodplain, or low terrace) but were generally dominated by rubber rabbitbrush (*Ericameria nauseosa*) and wild tarragon (*Artemisia dracunculus*) in the low flow channels and active floodplains. Low terrace vegetation included thick leaf yerba santa, basketbrush, giant wild rye (*Elymus condensatus*), and blue elderberry (*Sambucus nigra* ssp. *caerulea*). The upstream portions of the alluvial floodplains are surrounded by steep, mountainous areas dominated by chaparral and other scrubland assemblages. Grasslands and rabbitbrush scrub are common in less sloped portions of Area E. Riparian vegetation occurs in pockets along the alluvial floodplain and along an open water pond near the northern edge of Area E.

1.2 Mitigation Activities in Munz Canyon Restoration Site

In Area E, mitigation activities will occur on one alluvial floodplain known as the Munz Canyon Restoration Site (Figure 45). Plan-view drawings of the mitigation activities in the Munz Canyon Restoration Sites are included in Figure 46. Representative cross-sections can be seen in Figure 47.

To encourage natural hydrologic and geomorphological processes, the existing dam crest will be lowered so that it is at-grade with the upstream fan surface. The down slope of the dam will be protected with sub-grade riprap or gabion mattresses that will be buried and planted thereby preventing incision/erosion and reducing the water velocity. This will encourage dispersed water and sediment transport across the dam face and onto the floodplain consistent with alluvial floodplain geomorphology. Additionally, the deeply incised outflow channel will be plugged to prevent deeper incision while redirecting water flow back onto the alluvial floodplain surface. After earthwork is completed, alluvial floodplain vegetation will be seeded and the area will be monitored and managed for weed infestation. The alluvial floodplain seed mix is included in Table 25. The seed application rate is described in pounds of pure live seed (PLS) per acre. Parish's sagebrush is a locally rare species, and populations within the Castaic range are considered genetically unique. Because of this and limited availability of this species at seed suppliers and nurseries, seeds and cuttings will be collected onsite to be used in propagation.

The proposed improvements will provide for a fully functional operation during storm events up to a 50-year Capital Flood as defined by the Los Angeles County Department of Public Works (LACDPW). LACDPW considers their 50-year Capital Flood to be equivalent to a FEMA 100-year storm per Section 4.5 of the Los Angeles County Hydrology Manual (Hydrology Manual; LACDPW 2006).

After re-establishment, the active alluvial floodplain surfaces will be exposed to periodic flooding and sediment transport associated with flood events. Active channels will form naturally on the floodplain and will migrate across the surface with subsequent flood events. This regular pattern of hydrologic influence and disturbance will create suitable habitat for alluvial floodplain species and will deter the establishment of non-alluvial floodplain species such as grasses and mature scrub species.

In addition to these actions, the main access road on the dam of Munz Canyon will be decommissioned and returned to native habitats as depicted in Figure 47 and a degraded stock pond will be removed from the landscape. This will involve grading, and reseeding/planting with native species.

Table 25. Active Alluvial Floodplain Surface Seed Mix for the Munz Canyon Restoration Site

Scientific Name	Species Name	Approx. Application Rate (PLS (Lb.)/Acre)
Artemisia dracunculus[1]	wild tarragon	1.0
Artemisia tridentata ssp. parishii	Parish's sagebrush	1.0
Bromus ciliatus[1]	fringed brome	2.0
Elymus condensatus	giant wild rye	2.0
Elymus elymoides	bottlebrush squirreltail	2.0
Elymus trachycaulus	slender wheatgrass	2.0
Eriodictyon crassifolium	thick leaf yerba santa	3.0
Eriogonum fasciculatum	California buckwheat	2.0
Festuca microstachys[1]	small fescue	4.0
Lupinus truncatus	collared annual lupine	3.0
Hordeum brachyantherum	meadow barley	4.0
Melica imperfecta	smallflower melic	2.0
Muhlenbergia rigens	deergrass	2.0
Poa secunda	pine bluegrass	4.0
Salvia apiana	white sage	1.0
Salvia columbariae	chia sage	1.0
Stipa pulchra	purple needlegrass	4.0
	TOTAL	**40.0**

[1]*Species may not be available for seeding at large scale. Composition and application rate is subject to change based on availability and cost feasibility.*

1.3 Alternatives Analysis

VA Consulting has reviewed the USACE, Los Angeles District, Permit No. SPL-2014-00032-CLH dated January 22, 2014 (Guidance Document; USACE 2015) regarding the construction and application of bioengineered bank stabilization techniques. The content of the Guidance Document describes the use of living plants, minor grading, and other techniques to stabilize the banks of conveyances against the erosive and destabilizing effects of flow. The purpose of the review was to assess its applicability to site-specific conditions associated with the proposed restoration improvements required for the restoration of the Munz Canyon alluvial fan. Upon review of the USACE Guidance Document, VA Consulting has concluded that the bioengineered bank stabilization techniques described in the Guidance Document cannot be substituted for the presently proposed rock stabilization of the berm surface. The reasons for this conclusion are as follows:

1. Vegetative cover, if placed on the surface of the berm, would be subject to loss and subsequent sporadic coverage due to the infrequent water regime that is typical of alluvial fan surfaces. The supply of water to any given location on the surface of the berm is random. Vegetation, if planted as a part of a bioengineered approach, would not survive across the entire surface of the berm and the requirement that "living plants" be incorporated as a part of the stabilization process could not be fully achieved.
2. The stabilized berm surface will need to resist the erosive effects of flow passing over the downstream inclined surface. At locations where plant materials were not present (as explained in Reason No. 1 above), only the exposed sandy-silt soil would be present to resist the erosive effects of flow. VA Consulting estimates that flow velocities on the surface of the berm where vegetation is not present will be approximately 20 feet-per-second (fps) during a 50-year Capital Flood and approximately 18 fps during a 2-year storm event. Table 2-5 of the USACE design manual, Hydraulic Design of Flood Control Channels (EM 1110-2-1601) limits flow velocities over sandy-silt materials to 2 fps. Therefore, given the anticipated sporadic vegetative cover as indicated Reason No. 1 above, flow velocities over the surface of the berm at locations that are devoid of vegetation have the potential to damage the berm surface or cause a new breach of the berm.
3. A new breach in the existing berm caused by erosion would severely jeopardize the viability of the downstream alluvial fan surface and habitat. A breach in the berm would serve to concentrate flow along a single flow path and would prevent the random distribution of flow to other locations on the downstream alluvial fan. An example of this type of failure is present in the adjacent Lucky Canyon where a similar berm has been breached and the downstream alluvial fan is presently inactive. Therefore, sound engineered measures that propose to confidently stabilize the Munz Canyon berm are critical to the long-term viability of the alluvial fan restoration process.

In the absence of an exclusive bioengineered approach to stabilizing the surface of the berm, the presently proposed rock stabilization will be combined with a surficial vegetative treatment of the rock surface. Such an approach would include the placement of soil within the surface voids of the rock material and extending the soil depth to a point approximately 6 inches above the rock surface. The soil could then be planted with appropriate alluvial fan/drought tolerant vegetation.

While the long-term viability of surficial vegetation cannot be ensured, portions of the vegetative treatment will remain in place over an extended period of time as roots take hold and find support within the voids of the rock material. Furthermore, as earthen material is transported from the upstream canyon to the berm surface, areas of exposed rock surfaces will tend to be re-covered and potentially re-vegetated through natural processes.

1.4 Mitigation Types in Munz Canyon Restoration Site

1.4.1 Alluvial Floodplain Re-establishment

Re-establishment results in a net gain of aquatic resources. Alluvial floodplain re-establishment Mitigation Types will be generated downstream of the current dam through restoration of natural topography and hydrology provided by the adjacent stream and through the dam removal described above. These actions will return the landscape to its natural historic alluvial floodplain condition. This will increase the area of alluvial floodplain habitats but will also improve the functions of surrounding aquatic habitats including the downstream features like Elizabeth Lake.

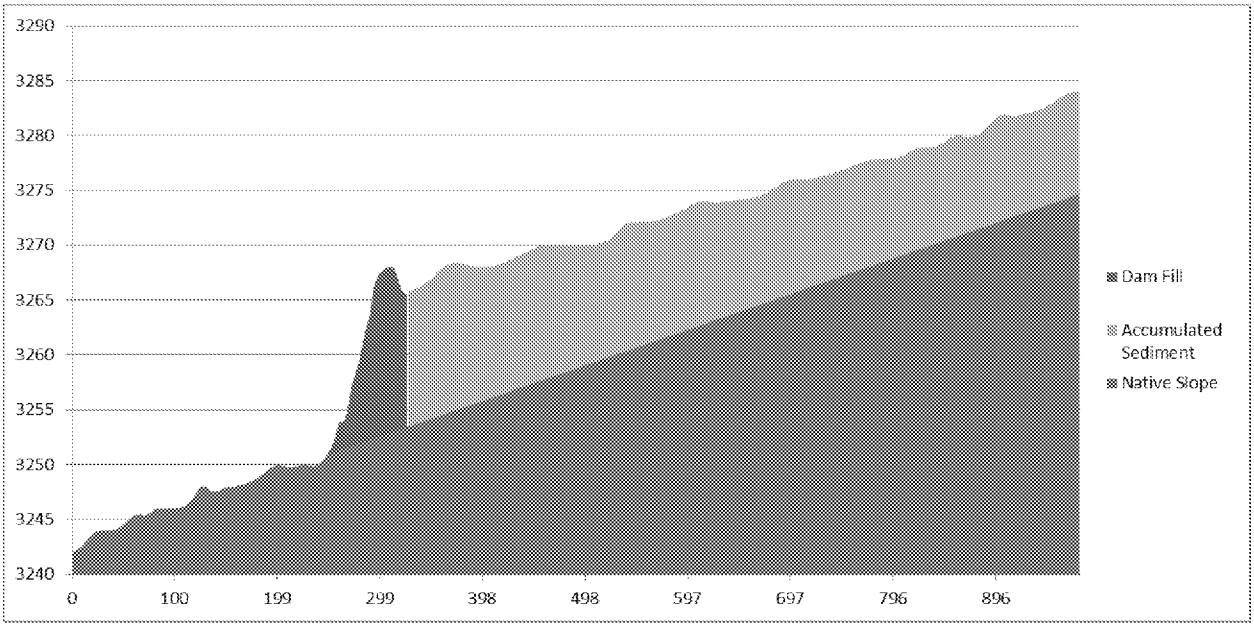
404 Re-establishment Credits associated with the alluvial floodplains are estimated based on the critical flow width that is expected to occur during a 10-year flood event. The remainder of the fan surface will initially provide credits based on the re-establishment of riparian buffer.

1.4.2 Alluvial Floodplain Rehabilitation

Rehabilitation will occur when improvements are made and new functions are added to an existing, degraded alluvial fan. Upstream of the dam, the existing alluvial fan will be improved by the restoration of natural topography and hydrology of the system. Dam removal allows for the restoration of upstream and downstream hydrology (Shafroth et al, 2002). By removing the existing dam crest in Munz Canyon and grading to the same height as the floodplain upstream of the existing dam, natural hydrologic processes will be restored, including flood and low-flow regimes, sediment transport processes and associated water table dynamics both upstream and downstream of the dam.

Historically the dam led to upstream ponding, as shown in Appendix D of the delineation report (Exhibit I), which includes a photograph (D-1) of the ponding that was taken in March, 2011. This prevented natural floodplain hydrological processes and instead resulted in ponding and excessive groundwater infiltration and sediment deposition. The ponding prevents sediment transport and causes excessive sediment deposition just above the dam, Over time this deposition has resulted in lower upstream channel slopes which decreases flow velocities, increases grownd water infiltration, and further increases sediment deposition upstream of the dam. These processes have been ongoing for more than 60 years and have resulted in roughly 15 feet of vertical sediment accumulation behind the dam, resulting in a wedge of deep sediment that is subject to reduced surface hydrology and natural disturbance patterns compared to natural conditions. This process is ongoing, with only minor sediment export conveyed through the incised outflow channel as evidenced by the substantial erosion immediately downstream of the dam and the lack of recent sediment deposits, compared to those occurring on the surface upstream of the dam. The cross-section presented below shows the accumulation of sediment and the difference between the naturally occurring slope and the current topography; the upstream hydrologic regime is therefore clearly significantly altered.

Lowering the crest elevation of the dam will immediately increase sediment transport, eliminate ponding, and increase natural disturbance regimes upstream of the dam by allowing for naturally migrating outflow patterns across the dam face. These changes will rehabilitate the entire alluvial floodplain and allow for the return of a more natural riparian vegetation community.



1.4.3 Non-wetland Riparian Re-Establishment

Non-wetland riparian re-establishment will occur adjacent to areas where riparian vegetation already occurs in small pockets and where it is presumed that larger non-wetland riparian habitats once existed based on hydrologic regimes in the area. These mitigation types will be the result of non-wetland riparian habitats planted in these areas.

1.4.4 Riparian Buffer Re-Establishment

Downstream of the dam removal, riparian buffers adjacent to the alluvial floodplain will be re-established as a result of the restoration of the alluvial floodplain. These areas exhibit typical riparian vegetation. As noted in Section 1.4.1, the portions of the fan surface not designated alluvial floodplain by the USACE constitute riparian buffer.

1.4.5 Upland Buffer Re-Establishment

Downstream of the dam removal, upland buffers adjacent to the alluvial floodplain will be re-established as a result of the restoration of the alluvial floodplain. Once the alluvial floodplain is re-established, these areas will become buffers because they will be within 100 feet of the edge of the aquatic resource.

1.5 Credits Generated in Munz Canyon Restoration Site

Ex. 4 CBI

Ex. 4 CBI

1.6 Performance Monitoring and Standards for the Munz Canyon Restoration Site

The performance of the Munz Canyon Restoration Site will be based on monitoring for appropriate hydrological, physical and biological properties of the rehabilitation areas upstream of the existing dam as well as the re-establishment areas downstream of the existing dam. The Munz Canyon Restoration Site will result in 404 credits as well as 1600 credits, and performance will be monitored using two different methods: CRAM and permanent transects (UPS) as discussed in the methods in Part I – Section 6.1.

1.6.1 CRAM Performance Standards

CRAM will be conducted within AAs #9, #10, #11 and #15 (Figure 48) in years 3, 4, and 5 following implementation of the mitigation activities to demonstrate improvement of the functional condition of the resources affected by the mitigation activities at this restoration site. For each AA the same CRAM module will be used that was used for determining baseline conditions. For each AA, target CRAM scores have been determined based on baseline conditions of the resources to be restored, analysis of the metrics that could be expected to improve as a result of the mitigation activities, and comparison with on-site resources.

AA #10 is located within the alluvial fan upstream of the Munz Canyon Dam and AA #9 is located at the downstream end of the existing outflow channel where it flows back onto the alluvial fan. Following post-fire passive revegetation through natural colonization and shrub resprout, these AA's are expected to be characteristic of the alluvial fan habitats below the dam following dam removal. As such, AAs #9 and #10 are suitable reference sites for re-established alluvial fan habitats at AAs #11 and #15. The post-fire restoration CRAM score at AA#10 is expected to be 85, and the CRAM score at AA# 9 is expected to be 85. Therefore, the target overall CRAM score for re-established alluvial fan habitats associated with the Munz Canyon Restoration Site is 85 (Table 27).

Table 27. CRAM Performance Standard for AAs at Munz Canyon Restoration Site

Metric/Submetric	Year 1	Year 2	Year 3	Year 4	Year 5	Final
Buffer and Landscape Context	NA	NA	92	92	92	92
Hydrology	NA	NA	92	92	92	92
Physical Structure	NA	NA	63	70	75	75
Biotic Structure	NA	NA	61	70	78	78
Overall	NA	NA	78	81	85	85

1.6.2 Uniform Performance Standards

The Munz Canyon Restoration Site will be monitored for measurable metrics that will demonstrate the success of the mitigation activities (Table 28). These performance standards will be monitored along permanent transects (Figure 48) and will assess the physical, hydrological, and biological aspects of the habitat affected by the mitigation actions. In the fire-affected Elizabeth Lake Bank Property, reference sites will use pre-fire vegetation data as a baseline for comparison because the vegetation site-wide is still recovering from the fire. Pre-fire vegetation data was collected in 2011 by WRA as part of the BRI surveys (WRA 2011), and is included in Exhibit H of the BEI. The percent cover for vegetation, as described in Table 28, was calculated using this pre-fire vegetation data as a reference site, in accordance with UPS protocol. Transect 2 traverses the upstream portion of the alluvial fan, above the dam. Following passive, post-fire revegetation, Transect 2 is expected to represent the type and quality of intact alluvial fan habitat that will be re-established below the dam. As such, Transect 2 will act as the reference standard for Transect 1.

Table 28. Uniform Performance Standards for the Munz Canyon Restoration Site

Type	Uniform Performance Standard	Year 1	Year 2	Year 3	Year 4	Year 5	Final
Physical:	*UPS #2*	The mitigation retains or increases stream stability and does not cause site, upstream, or downstream excessive erosion or aggradation. Specifically: Overall channel form should not indicate a consistent trajectory indicating a transition from a multi-thread to a single thread channel form.					
Hydrologic:	*Custom*	Field indicators of Ordinary High Water and distinct hydrogeomorphic floodplain units will be documented within the alluvial floodplain.					
Biological[1]:	*UPS #28 Dominance of Natives*	Cover of native species will be at least 5% absolute cover. At least 50% of this native cover will consist of shrubs.	Cover of native species will be at least 10% absolute cover. At least 50% of this native cover will consist of shrubs.	Cover of native species will be at least 20% absolute cover. At least 50% of this native cover will consist of shrubs.	Cover of native species will be at least 30% absolute cover. At least 50% of this native cover will consist of shrubs.	Cover of native species will be at least 50% absolute cover. At least 50% of this native cover will consist of shrubs.	Cover of native species will be at least 50% absolute cover. At least 50% of this native cover will consist of shrubs.
	UPS #29 Dominance of Exotics[2]	Relative cover of non-native, invasive species will be 0%.					
	UPS #31 Species Richness	Number of native species in planting areas will be ≥ 14 species					

1. Percent cover estimates were calculated using UPS standards and pre-fire vegetation data from reference sites within the Elizabeth Lake Bank Property.
2. Excluding non-native annual grasses listed as highly invasive Cal-IPC (2006) , which will be ≤ 10% cover.

2.0 OTHER MITIGATION ACTIVITIES

Portions of Area E outside the Munz Canyon Restoration Site will be enhanced through post-fire monitoring and management and cattle exclusion.

2.1 Mitigation Activities Outside of the Restoration Areas

2.1.1 Fire-Related Mitigation Activities

Post-fire monitoring and management will occur throughout Area E, as described in Part I – Section 5.2.1.

2.1.2 Cattle Exclusion

Cattle will be excluded from the northern and northeastern portions of Area E (Figure 45), as well as all planting and seeding areas until successful vegetation establishment, as described in Part I – Section 5.1.

2.1.3 Conservation Easement

A conservation easement will be established over the Bank Property, as described in Part I – Section 5.0. All habitats will be managed in perpetuity to protect their functions and conditions.

2.2 Mitigation Types Outside of the Restoration Areas

2.2.1 Enhancement

Post-fire monitoring and management and cattle exclusion will result in enhancement of alluvial floodplain, ephemeral stream, freshwater marsh, open water, wetland riparian, and non-wetland riparian. Additionally, in some instances, upstream restoration actions in the Munz Canyon alluvial floodplain described in Section 1.0 will restore natural hydrologic regimes and sediment deposition that will enhance down-stream resources including open water, wetland riparian, and ephemeral streams.

2.2.2 Preservation

The conservation easement will result in preservation of all covered species and habitat types within Area E that are not associated with a restoration site or otherwise enhanced, and will preserve these resources in perpetuity.

2.3 Credits Generated Outside of the Restoration Areas

Ex. 4 CBI

Ex. 4 CBI

PART VII. AREA F – ELIZABETH LAKE BANK PROPERTY

Area F consists of the eastern portion of the Elizabeth Lake Bank Property and is approximately 154 acres. Four restoration sites are located in Area F of the Elizabeth Lake Bank Property. All of these restoration sites are associated with alluvial floodplains. This section describes the following restoration sites labelled in Figure 53:

- Frakes Canyon Restoration Site (Restoration Site #2)
- Edgewater Canyon Restoration Site (Restoration Site #3)
- Turkey Tail Floodplain Restoration Site (Restoration Site #4)
- Joey Stream Restoration Site (Restoration Site #5)

1.0 EXISTING CONDITIONS

Within Area F of the Elizabeth Lake Bank Property, mitigation activities will occur within alluvial floodplain habitats that are currently impounded by various constraints, described in detail in the subsequent sections. As noted in Part VI, the entire Elizabeth Lake Bank Property was burned in the Powerhouse Fire in late May and early June of 2013, but recent surveys have indicated that resprouting of native shrubs and establishment of fire-colonizing species including chia (*Salvia columbariae*) and buckwheat (*Eriogonum sp.*).

Substrates within the alluvial floodplains vary from gravel to sand. Vegetation communities in alluvial fans are variable depending on the frequency of flow, disturbance, and topographic position (i.e., low-flow channel, active floodplain or low terrace) but were generally dominated by rubber rabbitbrush (*Ericameria nauseosa*) and wild tarragon in the low flow channels and active floodplains. Low terrace vegetation included thick leaf yerba santa, basketbrush, giant wild rye (*Elymus condensatus*), and blue elderberry (*Sambucus nigra* ssp. *caerulea*). The upstream portions of the alluvial floodplains are surrounded by steep, mountainous areas dominated by chaparral and other scrubland assemblages. Grasslands and rabbitbrush scrub are common in less sloped portions of Area F. Additionally, Elizabeth Lake and an associated marsh fringe are located in the northern portion of the Area F. Riparian vegetation occurs in pockets along the alluvial floodplains and along Elizabeth Lake.

2.0 FRAKES CANYON RESTORATION SITE (RESTORATION SITE #2)

2.1 Existing Conditions in the Frakes Canyon Restoration Site

The Frakes Canyon Restoration Site includes a portion of an alluvial floodplain that has been impounded by a road. The road is acting as a hydrologic impoundment to the downstream features of the alluvial floodplain, as illustrated by the sudden change from riparian vegetation above the road to non-riparian vegetation below the road. This has degraded the overall health of the alluvial floodplain and altered water flow paths from this alluvial floodplain to downstream features including Elizabeth Lake and adjacent riparian areas.

2.2 Mitigation Activities in the Frakes Canyon Restoration Site

Plan-view drawings of the mitigation activities in the Frakes Canyon Restoration Site are shown in Figure 54. Representative cross-sections are shown in Figure 55.

The existing road will be decommissioned and graded out to allow flows to continue onto the downstream floodplain surface. The road downslope of the alluvial floodplain appears to be redirecting flows to the west. Grading will occur within a small area, focusing on eliminating the dirt road and reconnecting flows to the downstream fan, in an effort to minimize impacts to other features within the alluvial floodplain system. Grading will create a consistent slope with the alluvial floodplain to encourage natural sediment transport and hydrology typical of alluvial floodplains. After grading, xeric alluvial floodplain species, including Parish's sagebrush, will be seeded and weeds will be managed. The alluvial floodplain seed mix is shown in Table 30.

Table 30. Active Alluvial Floodplain Surface Seed Mix for the Frakes Canyon

Scientific Name	Species Name	Approx. Application Rate (PLS (Lb.)/Acre)
Artemisia dracunculus[1]	wild tarragon	1.0
Artemisia tridentata ssp. parishii	Parish's sagebrush	1.0
Bromus ciliatus[1]	fringed brome	2.0
Elymus condensatus	giant wild rye	2.0
Elymus elymoides	bottlebrush squirreltail	2.0
Elymus trachycaulus	slender wheatgrass	2.0
Eriodictyon crassifolium	thick leaf yerba santa	3.0
Eriogonum fasciculatum	California buckwheat	2.0
Festuca microstachys[1]	small fescue	4.0
Lupinus truncatus	collared annual lupine	3.0
Hordeum brachyantherum	meadow barley	4.0
Melica imperfecta	smallflower melic	2.0
Muhlenbergia rigens	deergrass	2.0
Poa secunda	pine bluegrass	4.0
Salvia apiana	white sage	1.0
Salvia columbariae	chia sage	1.0
Stipa pulchra	purple needlegrass	4.0
	TOTAL	**40.0**

[1] *Species may not be available for seeding at large scale. Composition and application rate is subject to change based on availability and cost feasibility.*

2.3 Mitigation Types in the Frakes Canyon Restoration Site

2.3.1 Alluvial Floodplain Re-establishment

Re-establishment results in a net gain of aquatic resources. Alluvial floodplain re-establishment Mitigation Types will be generated through decommissioning of the road and grading of the area such that natural flows can reconnect to the floodplain system, after which floodplain species will be seeded. These actions will return the landscape to its natural topography and historic alluvial floodplain condition, leading to the re-establishment of all alluvial floodplain features downstream of the existing dam. This will increase the area of alluvial floodplain habitats but will also increase the functions of surrounding aquatic habitats. 404 Re-establishment Credits associated with the alluvial floodplains are estimated based on the critical flow width that is expected to occur during a 10-year flood event. The remainder of the fan surface will initially provide credits based on the re-establishment of riparian buffer.

2.3.2 Alluvial Floodplain Rehabilitation

Rehabilitation will occur in areas immediately downstream or adjacent to the impounded areas that will be re-established. The nearby re-establishment will improve the hydrologic and sediment transport functions of the existing alluvial floodplains, thereby rehabilitating the currently degraded downstream alluvial floodplain. Decommissioning and grading out the existing road that is currently impeding water flow will restore a more natural hydrologic regime, including flood and low-flow regimes and associated water table dynamics. The restored hydrological processes will begin to reverse the ponding and excessive sediment deposition that resulted from the impoundment, as well as bring back the vegetation disturbance associated with flow events. These changes will rehabilitate the entire alluvial floodplain and allow for the return of a more natural riparian vegetation community.

2.3.3 Ephemeral Stream/Riparian Buffer Rehabilitation

Decommissioning the road and grading will restore a natural flow regime to the ephemeral stream upstream of the road. This will improve the hydrologic and sediment transport functions of the existing alluvial floodplains, thereby rehabilitating the currently degraded stream and riparian buffer.

2.4 Credits Generated in the Frakes Canyon Restoration Site

Ex. 4 CBI

Ex. 4 CBI

2.5 Performance Monitoring and Standards for the Frakes Canyon Restoration Site

The performance of Frakes Canyon Restoration Site will be based on monitoring for appropriate hydrological, physical and biological properties of the rehabilitation areas upstream of the road, which is functioning as an impoundment, as well as the re-establishment areas downstream of the road. The Frakes Canyon Restoration Site will result in 1600 credits, and performance will be monitored using permanent transects as discussed in the methods in Part I – Section 6.1. Because there are no performance-based wetlands within the Frakes Canyon Restoration Site, CRAM will not be conducted.

2.5.1 Uniform Performance Standards

The Frakes Canyon Restoration Site will be monitored for measurable metrics that will demonstrate the success of the mitigation activities (Table 32). These performance standards will be monitored along permanent transects (Figure 56) and will assess the physical, and biological aspects of the habitat affected by the mitigation actions. In the fire-affected Elizabeth Lake Bank Property, reference sites will use pre-fire vegetation data as a baseline for comparison since the vegetation site-wide is still recovering from the fire. Pre-fire vegetation data was collected in 2011 by WRA as part of the BRI surveys (WRA 2011), and is included in Exhibit H of the BEI. The percent cover for vegetation, as shown in Table 32, was calculated using this pre-fire vegetation data as a reference site, in accordance with UPS protocol. Transect 4 traverses the upstream portion of the alluvial fan, above the road. Transect 3 traverses the downstream portion of the alluvial fan, below the road where the alluvial fan is expected to widen. Following post-fire revegetation, Transect 4 is expected to represent the type and quality of intact alluvial fan habitat that will be re-established below the dam. As such, Transect 4 will act as the reference standard for Transect 3.

Table 32. Uniform Performance Standards for the Frakes Canyon Restoration Site

Type	Uniform Performance Standard	Year 1	Year 2	Year 3	Year 4	Year 5	Final
Physical:	*UPS #2*	The mitigation retains or increases stream stability and does not cause site, upstream, or downstream excessive erosion or aggradation. Specifically: Overall channel form should not indicate a consistent trajectory indicating a transition from a multi-thread to a single thread channel form.					
Hydrologic:	*Custom*	Field indicators of Ordinary High Water and distinct hydrogeomorphic floodplain units will be documented within the alluvial floodplain.					
Biological[1]:	*UPS #28 Dominance of Natives*	Cover of native species will be at least 15% absolute cover	Cover of native species will be at least 22.5% absolute cover	Cover of native species will be at least 35% absolute cover	Cover of native species will be at least 45% absolute cover	Absolute cover of native species will be at least 50% absolute cover	Absolute cover of native species will be at least 50% absolute cover
	UPS #29 Dominance of Exotics[2]	Relative cover of non-native, invasive species will be 0%					
	UPS #31 Species Richness	Number of native species in planting areas ≥ 14 species					

1. Percent cover estimates were calculated using UPS standards and pre-fire vegetation data from reference sites within the Elizabeth Lake Bank Property. See Exhibit H of the BEI for these data.
2. Excluding non-native annual grasses listed as highly invasive Cal-IPC (2006), which will be ≤ 10% cover.

3.0 EDGEWATER CANYON RESTORATION SITE (RESTORATION SITE #3)

3.1 Existing Conditions in the Edgewater Canyon Restoration Site

The Edgewater Canyon Restoration Site includes a portion of an alluvial floodplain. This alluvial floodplain is fed by a canyon stream. The stream is impounded by a small pond. Due to the low-flow of the stream, the small pond captures water from the canyon, which then evaporates/percolates over time, without contributing to downstream alluvial floodplain habitat.

3.2 Mitigation Activities in the Edgewater Canyon Restoration Site

Plan-view drawings of the mitigation activities in the Edgewater Canyon Restoration Site are shown in Figure 57. Representative cross-sections are shown seen in Figure 58.

Rehabilitation activities for this alluvial floodplain will raise the bottom elevation of a small pond with soil excavated from the removal of surrounding earthen berms. This will be followed by grading of the pond area to return the slope to that of the greater alluvial floodplain surface. Grading will occur in a very small area to minimize potential impacts to the alluvial floodplain. These rehabilitation activities will remove the hydrologic impoundment to the alluvial floodplain and allow flows to disperse across floodplain surface at more regular intervals. Following earthwork, xeric-riparian alluvial floodplain species, listed in Table 33, will be seeded. Weeds will also be monitored and managed in the re-establishment and rehabilitation areas.

Table 33. Active Alluvial Floodplain Surface Seed Mix for the Edgewater Canyon Restoration Site

Scientific Name	Species Name	Approx. Application Rate (PLS (Lb.)/Acre)
Artemisia dracunculus[1]	wild tarragon	1.0
Artemisia tridentata ssp. parishii	Parish's sagebrush	1.0
Bromus ciliatus[1]	fringed brome	2.0
Elymus condensatus	giant wild rye	2.0
Elymus elymoides	bottlebrush squirreltail	2.0
Elymus trachycaulus	slender wheatgrass	2.0
Eriodictyon crassifolium	thick leaf yerba santa	3.0
Eriogonum fasciculatum	California buckwheat	2.0
Festuca microstachys[1]	small fescue	4.0
Lupinus truncatus	collared annual lupine	3.0
Hordeum brachyantherum	meadow barley	4.0
Melica imperfecta	smallflower melic	2.0
Muhlenbergia rigens	deergrass	2.0
Poa secunda	pine bluegrass	4.0
Salvia apiana	white sage	1.0
Salvia columbariae	chia sage	1.0
Stipa pulchra	purple needlegrass	4.0
	TOTAL	**40.0**

1. Species may not be available for seeding at large scale. Composition and application rate is subject to change based on availability and cost feasibility.

3.3 Mitigation Types in the Edgewater Canyon Restoration Site

3.3.1 Alluvial Floodplain Re-Establishment

Re-establishment results in a net gain of aquatic resources. Alluvial floodplain re-establishment Mitigation Types will be generated through raising the bottom elevation of the existing pond, eliminating the stream impoundment and returning the landscape to its natural topography and historic alluvial floodplain condition. Replanting of native alluvial floodplain species will further re-establish the floodplain, increasing the area of alluvial floodplain habitats and the functions of surrounding aquatic habitats. 404 Re-establishment Credits associated with the alluvial floodplains are estimated based on the critical flow width that is expected to occur during a 10-year flood event. The remainder of the fan surface will initially provide credits based on the re-establishment of riparian buffer.

3.3.2 Alluvial Floodplain Enhancement

Re-establishment of the natural alluvial floodplain will also improve the functions of the existing alluvial floodplains immediately upstream of the pond. By improving the sediment transport functions of the stream and re-establishing the downstream alluvial floodplain, removing the pond will result in enhancement of the currently degraded upstream alluvial floodplain. Returning the pond area slope to that of the greater floodplain surface will restore a more natural hydrologic regime, including flood and low-flow regimes and associated water table dynamics. Restoration of the hydrologic regime will in turn rehabilitate the entire alluvial floodplain, both up- and downstream, and allow for the return of more natural riparian vegetation community.

3.3.3 Riparian Buffer Re-Establishment

Riparian buffers adjacent to the alluvial floodplain and freshwater marsh will be re-established as a result of the restoration of the alluvial floodplain. These areas exhibit typical riparian vegetation. As noted in Section 3.3.1, the portions of the fan surface not designated alluvial floodplain by the USACE constitute riparian buffer.

3.3.4 Riparian Buffer Rehabilitation

Riparian buffer rehabilitation will occur in areas dominated by riparian species adjacent to the ephemeral stream where the natural flow regime will restore riparian habitats to high quality native plant communities.

3.4 Credits Generated in the Edgewater Canyon Restoration Site

Ex. 4 CBI

3.5 Performance Monitoring and Standards in the Edgewater Canyon Restoration Site

The performance of the Edgewater Canyon Restoration Site will be based on monitoring for appropriate hydrological, physical and biological properties of the rehabilitation areas upstream of the pond as well as the re-establishment areas downstream of the pond. The Edgewater Canyon Restoration Site will result in 1600 credits, and performance will be monitored using permanent transects as discussed in the methods in Part I – Section 6.1. Because there are no performance-based wetlands within the Edgewater Canyon Restoration Site, CRAM will not be conducted.

3.5.1 Uniform Performance Standards

The Edgewater Canyon Restoration Site will be monitored for measurable metrics that will demonstrate the success of the mitigation activities (Table 35). These performance standards will be monitored along permanent transects (Figure 56) and will assess the physical, and biological aspects of the habitat affected by the mitigation actions. In the fire-affected Elizabeth Lake Bank Property, reference sites will use pre-fire vegetation data as a baseline for comparison since the vegetation site-wide is still recovering from the fire. Pre-fire vegetation data was collected in 2011 by WRA as part of the BRI surveys (WRA 2011), and is included in Exhibit H of the BEI. The percent cover for vegetation, as shown in Table 35, was calculated using this pre-fire vegetation data as a reference site, in accordance with UPS protocol. Transect 6 traverses the upstream portion of the alluvial fan, near the pond. Transect 5 traverses the downstream portion of the alluvial fan, below the pond. Following post-fire revegetation, Transect 6 is expected to represent the type and quality of intact alluvial fan habitat that will be re-established below the pond. As such, Transect 6 will act as the reference standard for Transect 5.

Table 35. Uniform Performance Standards for the Edgewater Canyon Restoration Site

Type	Uniform Performance Standard	Year 1	Year 2	Year 3	Year 4	Year 5	Final
Physical:	*UPS #2*	The mitigation retains or increases stream stability and does not cause site, upstream, or downstream excessive erosion or aggradation. Specifically: Overall channel form should not indicate a consistent trajectory indicating a transition from a multi-thread to a single thread channel form.					
Hydrologic:	Custom	Field indicators of Ordinary High Water and distinct hydrogeomorphic floodplain units will be documented within the alluvial floodplain.					
Biological[1]:	*UPS #28 Dominance of Natives*	Cover of native species will be at least 15% absolute cover	Cover of native species will be at least 20% absolute cover	Cover of native species will be at least 30% absolute cover	Cover of native species will be at least 40% absolute cover	Cover of native species will be at least 50% absolute cover	Cover of native species will be at least 50% absolute cover
	UPS #29 Dominance of Exotics[2]	Relative cover of non-native, invasive species will be 0%					
	UPS #31 Species Richness	Number of native species in planting areas ≥ 14 species					

1. Percent cover estimates were calculated using UPS standards and pre-fire vegetation data from reference sites within the Elizabeth Lake Bank Property. See Exhibit H of the BEI for these data.
2. Excluding non-native annual grasses listed as highly invasive Cal-IPC (2006), which will be ≤ 10% cover.

4.0 TURKEY TAIL FAN RESTORATION SITE (RESTORATION SITE #4)

4.1 Existing Conditions in the Turkey Tail Floodplain Restoration Site

The Turkey Tail Floodplain Restoration Site is related to an alluvial floodplain in the eastern portion of Area F. Presently, flow on the upper portions of the alluvial fan surface is mostly intercepted by a paved dead-end roadway, Joey Road, which provides access to the existing residences. Once flow is intercepted by Joey Road it is prevented from re-entering the alluvial fan. As such, the Turkey Tail Floodplain Restoration Site alluvial fan is presently inactive. This alluvial floodplain is highly incised due to increased water velocity caused by a storm-drain. A road and associated storm-drain exist on the eastern side of the Elizabeth Lake Bank Property. This road intercepts and redirects watershed runoff into a storm-drain, which is currently causing severe erosion and incision at the outflow, which is on the Bank Property. This has contributed to degraded alluvial floodplain habitat in this area including increased water velocity, erosion, and altered hydrology.

4.2 Mitigation Activities in the Turkey Tail Floodplain Restoration Site

Plan-view drawings of the mitigation activities in the Turkey Tail Floodplain Restoration Site are shown in Figure 59. Representative cross-sections are shown in Figure 60.

The restoration of the Turkey Tail Floodplain Restoration Site alluvial fan will include modifications to Joey Road at the location where alluvial fan flows are presently intercepted and diverted. The modifications will include enhancing the performance of the existing westerly gutter of the road in order to promote the interception of canyon flow. The gutter will be sloped to a proposed collector channel that will discharge into a distribution channel leading to the alluvial fan. The distribution channel will outlet into a graded area that will allow flows to randomly proceed downstream over the alluvial fan surface. This will be seeded with the seed mix described in Table 36.

To reduce flow velocity and the erosional capability of this water, mitigation activities will occur in two areas along this road. The Turkey Tail Floodplain Restoration Site ties into the existing road, upstream of the storm drain. Mitigation activities in the Turkey Tail Floodplain Restoration Site are intended to capture some of the water flowing down the road to reintroduce hydrology to the historic channels on the Bank Property in this area and to lessen the amount and impact of water received in the storm drain. To accomplish this, an enhanced gutter and speed bump will be placed in the road. The speed bump will direct water into the gutter, which will then funnel flows into a concrete-lined collector channel. This channel will release the water over a spreading zone that feeds into two historic channels. This spreading zone will be protected with buried rip-rap. All hard-structures will be omitted from the crediting. Although the speed bump and gutter are outside of the creditable areas, these activities and improvements will improve the hydrology of the downstream alluvial floodplain by creating normal, low-velocity flows typical of alluvial floodplain habitats. This will reintroduce flows into this historic floodplain and encourage natural hydrology and sediment deposition. Additionally, these actions will reduce the amount of water and water velocity received by the storm drain downslope in the Joey Stream Restoration Site (Restoration Site #5). Seeding of native species, weed monitoring, and weed management will also occur in this restoration site.

The proposed improvements will function adequately during all storm events up to and including a 50-year Capital Flood as defined by the LACDPW. LACDPW considers their 50-year Capital Flood to be equivalent to a FEMA 100-year storm per Section 4.5 of the Hydrology Manual (LACDPW 2006).

4.3 Alternatives Analysis

VA Consulting has reviewed the USACE, Los Angeles District, Permit No. SPL-2014-00032-CLH dated January 22, 2014 (Guidance Document; USACE 2014) regarding the construction and application of bioengineered bank stabilization techniques. The content of the Guidance Document describes the use of living plants, minor grading, and other techniques to stabilize the banks of conveyances against the erosive and destabilizing effects of flow. The purpose of the review was to assess its applicability to site-specific conditions associated with the proposed restoration improvements required for the restoration of the Turkey Tail Floodplain Restoration Site alluvial fan. Upon review of the USACE Guidance Document, VA Consulting has concluded that the bioengineered bank stabilization techniques described in the Guidance Document cannot be substituted for the presently proposed rock stabilization of the berm surface. The reasons for this conclusion are as follows:

1. The proposed modifications to Joey Road will require that the portions of the roadway being modified be replaced in-kind with a hardened drivable surface capable of supporting vehicular traffic loads.
2. Once flows are collected by the proposed modifications to Joey Road, they need to be safely conveyed to the location of the existing alluvial fan. These flows will be concentrated and traveling at an estimated minimum velocity of approximately 14 fps in both the collector channel and rock-lined distribution channel. Table 2-5 of the USACE design manual, Hydraulic Design of Flood Control Channels (EM 1110-2-1601) limits flow velocities in vegetated channels to a maximum of 8 fps under the best of vegetative conditions. As such, bioengineered stabilization techniques cannot be safely used for these conveyances.

Table 36. Active Alluvial Floodplain Surface Seed Mix for the Turkey Tail Floodplain Restoration Site

Scientific Name	Species Name	Approx. Application Rate (PLS (Lb.)/Acre)
Artemisia dracunculus[1]	wild tarragon	1.0
Artemisia tridentata ssp. parishii	Parish's sagebrush	1.0
Bromus ciliatus[1]	fringed brome	2.0
Elymus condensatus	giant wild rye	2.0
Elymus elymoides	bottlebrush squirreltail	2.0
Elymus trachycaulus	slender wheatgrass	2.0
Eriodictyon crassifolium	thick leaf yerba santa	3.0
Eriogonum fasciculatum	California buckwheat	2.0
Festuca microstachys[1]	small fescue	4.0
Lupinus truncatus	collared annual lupine	3.0
Hordeum brachyantherum	meadow barley	4.0
Melica imperfecta	smallflower melic	2.0
Muhlenbergia rigens	deergrass	2.0
Poa secunda	pine bluegrass	4.0
Salvia apiana	white sage	1.0
Salvia columbariae	chia sage	1.0
Stipa pulchra	purple needlegrass	4.0
	TOTAL	**40.0**

1. Species may not be available for seeding at large scale. Composition and application rate is subject to change based on availability and cost feasibility.

In the absence of an exclusive bioengineered approach to the proposed improvements at the Turkey Tail Floodplain Restoration Site, the presently proposed rock-lined distribution channel will be combined with a surficial vegetative treatment. Such an approach would include the placement of soil within the surface voids of the rock material and extending the soil depth to a point approximately 6 inches above the rock surface. The soil could then be planted with appropriate drought tolerant vegetation.

While the long-term viability of surficial vegetation cannot be ensured, portions of the vegetative treatment will remain in place over an extended period of time as roots take hold and find support within the voids of the rock material. Furthermore, as earthen material is transported from the upstream canyon to the distribution channel, areas of exposed rock surfaces in the channel will tend to be re-covered and potentially re-vegetated through natural processes.

4.4 Mitigation Types in the Turkey Tail Floodplain Restoration Site

4.4.1 Alluvial Floodplain Re-establishment

Re-establishment results in a net gain of aquatic resources. Alluvial floodplain re-establishment mitigation types will be generated when the hard structures described in Section 4.2 create normal, low-velocity flows into the floodplain, which in turn lead to natural floodplain hydrology and sediment deposition. When coupled with seeding of native floodplain species, these activities will increase the area of alluvial floodplain habitats and the functions of surrounding aquatic habitats. 404 Re-establishment Credits associated with the alluvial floodplains are estimated based on the critical flow width that is expected to occur during a 10-year flood event. The remainder of the fan surface will initially provide credits based on the re-establishment of riparian buffer.

4.4.2 Riparian Buffer Re-Establishment

Riparian buffers adjacent to the alluvial floodplain will be re-established as a result of the restoration of the alluvial floodplain. These areas exhibit typical riparian vegetation. As noted in Section 4.4.1, the portions of the fan surface not designated alluvial floodplain by the USACE constitute riparian buffer.

4.4.3 Upland Buffer Re-Establishment

Upland buffers adjacent to the alluvial floodplain will be re-established as a result of the restoration of the alluvial floodplain. Once the alluvial floodplain is re-established, these areas will become buffers because they will be within 200 feet of the edge of the aquatic resource.

4.5 Credits Generated in the Turkey Tail Restoration Site

Ex. 4 CBI

4.6 Performance Monitoring and Standards

The performance of Turkey Tail Floodplain Restoration Site will be based on monitoring for appropriate hydrological, physical and biological properties of the rehabilitation areas related to the culvert repair, regrading, revegetation, and other mitigation activities conducted in Turkey Tail

Floodplain Restoration Site. The Turkey Tail Floodplain Restoration Site will result in 404 credits as well as 1600 credits, and performance will be monitored using two different methods: CRAM and permanent transects (UPS) as discussed in the methods in Part I – Section 6.1.

4.6.1 CRAM Performance Standards

CRAM will be conducted within AA #4 (Figure 56) in years 3, 4, and 5 following implementation of the mitigation activities to demonstrate improvement of the functional condition of the resources affected by the mitigation activities at the Turkey Tail Floodplain Restoration Site. For each AA the same CRAM module will be used that was used for determining baseline conditions. For each AA, target CRAM scores have been determined based on baseline conditions of the resources to be restored, analysis of the metrics that could be expected to improve as a result of the mitigation activities, and comparison with on-site resources.

A second reference site within the Turkey Tail Floodplain Restoration Site does not exist. Therefore, a nearby alluvial fan, Munz Canyon, will be used as a reference site. Munz Canyon contains two potential reference sites, AAs #9 and #10 (Figure 48), which will be representative of alluvial fan habitat. AA #10 is located within the Alluvial Fan upstream of the Munz Canyon Dam and AA #9 is located at the downstream end of the existing outflow channel where it flows back onto the alluvial fan. Following post-fire revegetation these AA's are expected to be characteristic of the alluvial fan habitats in the Turkey Tail Floodplain Restoration Site. As such, AAs #9 and#10 are suitable reference sites for re-established alluvial fan habitats at AA #4. The post-fire restoration CRAM score at AA #10 is expected to be 85, and the CRAM score at AA #9 is expected to be 85. Therefore, the target overall CRAM score for re-established alluvial fan habitats associated within the Turkey Tail Floodplain Restoration Site is 85 (Table 38).

Table 38. CRAM Performance Standard for AAs the Turkey Tail Floodplain Restoration Site

Metric/ Submetric	Year 1	Year 2	Year 3	Year 4	Year 5	Final
Buffer and Landscape Context	NA	NA	93	93	93	93
Hydrology	NA	NA	92	92	92	92
Physical Structure	NA	NA	63	63	75	75
Biotic Structure	NA	NA	61	61	78	78
Overall	NA	NA	78	78	85	85

4.6.2 Uniform Performance Standards

The Turkey Tail Floodplain Restoration Site will be monitored for measurable metrics that will demonstrate the success of the mitigation activities (Table 39). These performance standards will be monitored along permanent transects (Figure 56) and will assess the physical, hydrological, and biological aspects of the habitat affected by the mitigation actions. In the fire-affected Elizabeth Lake Bank Property, reference sites will use pre-fire vegetation data as a baseline for comparison because the vegetation site-wide is still recovering from the fire. Pre-fire vegetation data was collected in 2011 by WRA as part of the BRI surveys (WRA 2011), and is included in Exhibit H of the BEI. The percent cover for vegetation, as shown in Table 39, was calculated using this pre-fire vegetation data as a reference site, in accordance with UPS protocol. Transects 7 and 8 are located within the Turkey Tail Floodplain Restoration Site. Transect 8 traverses the upstream portion of the alluvial fan included within the Turkey Tail Floodplain Restoration Site. Transect 7 is located downstream of Transect 8 where the restored alluvial floodplain is expected to widen. Following post-fire revegetation, Transect 2 is expected to represent the type and quality of intact alluvial fan habitat that will be re-established in this area. As such, Transect 2 will act as the reference standard for Transects 7 and 8.

Table 39. Uniform Performance Standards for the Turkey Tail Floodplain Restoration Site

Type	Uniform Performance Standard	Year 1	Year 2	Year 3	Year 4	Year 5	Final
Physical:	*UPS #2*	The mitigation retains or increases stream stability and does not cause site, upstream, or downstream excessive erosion or aggradation. Specifically: Overall channel form should not indicate a consistent trajectory indicating a transition from a multi-thread to a single thread channel form.					
Hydrologic:	*Custom*	Field indicators of Ordinary High Water and distinct hydrogeomorphic floodplain units will be documented within the alluvial floodplain.					
Biological[1]:	*UPS #28 Dominance of Natives*	Cover of native species will be at least 5% absolute cover	Cover of native species will be at least 10% absolute cover	Cover of native species will be at least 20% absolute cover	Cover of native species will be at least 30% absolute cover	Cover of native species will be at least 50% of the cover	Cover of native species will be at least 50% absolute cover
	UPS #29 Dominance of Exotics[2]	Relative cover of non-native, invasive species will be 0%.					
	UPS #31 Species Richness	Number of native species in planting areas ≥ 14 species					

1. Percent cover estimates were calculated using UPS standards and pre-fire vegetation data from reference sites within the Elizabeth Lake Bank Property. See Exhibit H of the BEI for these data.
2. Excluding non-native annual grasses listed as highly invasive Cal-IPC (2006) , which will be ≤ 10% cover.

5.0 JOEY STREAM RESTORATION SITE (RESTORATION SITE #5)

5.1 Existing Conditions in the Joey Stream Restoration Site

Under existing conditions, flow from the canyon that is a tributary to the Turkey Tail Floodplain Restoration Site is intercepted by Joey Road and is conveyed within the roadway section to the location where Joey Road changes from a north-south alignment to an east-west alignment. At this location flow is either partially intercepted by an existing storm drain inlet or overflows the inlet. Both the storm drain flow from the inlet and the inlet overflow discharge into a natural conveyance that has experienced significant erosion. The natural conveyance extends for a distance of approximately 450 feet downstream to the bank areas of Lake Elizabeth. The Joey Stream Restoration Site will include the restoration of eroded natural conveyance.

The Joey Stream Restoration Site is related to an ephemeral stream and alluvial floodplain in the eastern portion of Area F. The activities within this the Joey Stream Restoration Site are closely related to the activities within the Turkey Tail Floodplain Restoration Site (Restoration Site #4). The Joey Stream Restoration Site is located downstream of the fallout channel below the in-road storm drain. Currently, this area is highly eroded and contains a deeply incised channel due to high-velocity roadside runoff. This has contributed to degradation of alluvial floodplain habitat in this area including increased water velocity, erosion, and altered hydrology.

5.2 Mitigation Activities in the Joey Stream Restoration Site

Plan-view drawings of the mitigation activities in the Joey Stream Restoration Site are shown in Figure 61. Representative cross-sections are shown in Figure 62.

The proposed restoration of the Joey Stream Restoration Site will include the repair and armoring of the existing storm drain outlet that discharges storm water into the site. Repairs will include the infilling of the existing scour-hole that has formed at the outlet. Once filled, the outlet area will be lined with rip-rap to protect it against future erosion. Furthermore, the interception and redistribution of alluvial fan flows to the Turkey Tail Floodplain Restoration Site (Restoration Site #4) (see section 4.0) will significantly reduce flows to the site and reduce the overall erosion potential. It is important to note that the restoration of the Joey Stream Restoration Site should not proceed in the absence of the restoration of the Turkey Tail Floodplain Restoration Site.

Downstream of the storm drain outlet, the existing erosion in the conveyance will be filled. As a result, the flow conveyance section will be widened. Plantings will be established throughout the widened conveyance section to promote wetland type vegetation and habitat and provide protection against future erosion.

After re-directing the flow from the adjacent roadway in Turkey Tail Floodplain Restoration Site into the historic channels, the water velocity and hydric input received by the Joey Stream Restoration Site will be drastically reduced, which will prevent future incision. Additionally, the currently incised channel will be graded to create a more natural floodplain, continuous with the surrounding uplands. Rip-rap and boulders will be buried in the soil directly beneath the storm drain outfall to reduce the water velocity and erosional potential of hydric inputs from this storm drain. The mitigation activities in the Joey Stream Restoration Site, in combination with Turkey Tail Floodplain Restoration Site, will result in natural sediment deposition and hydrology regimes. This will encourage the development of low-flow braided channels, sediment deposition, and hydrologic regimes typical of alluvial floodplains in the area. Seeding of native species, weed monitoring, and weed management will also occur in this alluvial floodplain Restoration Site. This restoration site will be seeded with the mix described in Table 40.

The proposed improvements will provide for a fully functional operation during storm events up to a 50-year Capital Flood as defined by the LACDPW. LACDPW considers their 50-year Capital Flood to be equivalent to a FEMA 100-year storm per Section 4.5 of the Hydrology Manual (LACDPW 2006).

Table 40. Active Alluvial Floodplain Surface Seed Mix for the Joey Stream Restoration Site

Scientific Name	Species Name	Approx. Application Rate (PLS (Lb.)/Acre)
Artemisia dracunculus[1]	wild tarragon	1.0
Artemisia tridentata ssp. parishii	Parish's sagebrush	1.0
Bromus ciliatus[1]	fringed brome	2.0
Elymus condensatus	giant wild rye	2.0
Elymus elymoides	bottlebrush squirreltail	2.0
Elymus trachycaulus	slender wheatgrass	2.0
Eriodictyon crassifolium	thick leaf yerba santa	3.0
Eriogonum fasciculatum	California buckwheat	2.0
Festuca microstachys[1]	small fescue	4.0
Lupinus truncatus	collared annual lupine	3.0
Hordeum brachyantherum	meadow barley	4.0
Melica imperfecta	smallflower melic	2.0
Muhlenbergia rigens	deergrass	2.0
Poa secunda	pine bluegrass	4.0
Salvia apiana	white sage	1.0
Salvia columbariae	chia sage	1.0
Stipa pulchra	purple needlegrass	4.0
	TOTAL	**40.0**

[1] Species may not be available for seeding at large scale. Composition and application rate is subject to change based on availability and cost feasibility.

5.3 Alternatives Analysis

The use of bioengineered stabilization technics are warranted and presently proposed for the restoration locations located downstream of the storm drain outlet area. It is anticipated that the reduction of flow associated with the Turkey Tail Floodplain Restoration Site improvements in combination with the energy dissipation provided by the proposed riprap placement at the storm drain outlet will reduce flow velocities to non-erosive levels through the bio-stabilized restoration locations.

The use of bioengineered stabilization techniques at the storm drain outlet is not recommended. Flows discharging from the storm drain are anticipated to exceed 8 fps, which is the velocity limit for vegetated channels as specified in Table 2-5 of EM 1110-2-1601. Additionally, flows exiting the storm drain will be highly confined by the narrow width of the upstream pipe. The proposed riprap lining in the immediate vicinity of the of the storm drain outlet will serve to distribute flow to the total width of the downstream restoration locations as well as reduce flow velocities to levels that are compatible with the proposed bio-stabilized conveyance.

5.4 Mitigation Types in the Joey Stream Restoration Site

5.4.1 Ephemeral Stream Rehabilitation

Stream rehabilitation Mitigation Types will be generated when improvements are made and new functions are added to an existing, degraded stream. Stream rehabilitation will occur through modification of hydrology, slope protection and channel bed alteration of an existing incised channel fed by an undersized culvert along the western bank boundary. Stream rehabilitation measures will be related to impoundment removal activities in downstream alluvial floodplains as well as post-fire monitoring and management.

5.4.2 Alluvial Floodplain Re-establishment

Re-establishment results in a net gain of aquatic resources. Alluvial floodplain re-establishment Mitigation Types will be generated through activities including interception and redistribution of alluvial fan flows, and replanting of native alluvial floodplain species. These actions will return the landscape to its natural topography and historic alluvial floodplain condition. These activities as well as seeding of alluvial floodplain species, will increase the area of alluvial floodplain habitats and increase the functions of surrounding aquatic habitats. 404 Re-establishment Credits associated with the alluvial floodplains are estimated based on the critical flow width that is expected to occur during a 10-year flood event. The remainder of the fan surface will initially provide credits based on the re-establishment of riparian buffer.

5.4.3 Alluvial Floodplain Rehabilitation

Alluvial floodplain rehabilitation Mitigation Types will be generated where the re-establishment activities discussed in Section 5.2 above enhance the functions of existing alluvial floodplain downstream of the re-established floodplain. These actions will restore the hydrologic and sediment transport functions of the existing alluvial floodplain, resulting in its rehabilitation.

5.4.4 Riparian Buffer Re-Establishment

Riparian buffers adjacent to the alluvial floodplain will be re-established as a result of the restoration of the alluvial floodplain. As noted in Section 5.4.3, the portions of the fan surface not designated alluvial floodplain by the USACE constitute riparian buffer.

5.4.5 Upland Buffer Re-Establishment

Upland buffers adjacent to the alluvial floodplain will be re-established as a result of the restoration of the alluvial floodplain. Once the alluvial floodplain is re-established, these areas will become buffers because they will be within 200 feet of the edge of the aquatic resource.

5.5 Credits Generated in the Joey Stream Restoration Site

Ex. 4 CBI

5.6 Performance Monitoring and Standards for the Joey Stream Restoration Site

The performance of the Joey Stream Restoration Site will be based on monitoring for appropriate hydrological, physical and biological properties of the rehabilitation areas related to culvert replacement, redirection of flows, regrading, and other mitigation activities. The Joey Stream Restoration Site will result in 404 credits as well as 1600 credits, and performance will be monitored using two different methods: CRAM and permanent transects (UPS) as discussed in the methods in Part I – Section 6.1.

5.6.1 CRAM Performance Standards

CRAM will be conducted within AA # 2 in years 3, 4, and 5 following implementation of the mitigation activities to demonstrate improvement of the functional condition of the resources affected by the mitigation activities at the Joey Stream Restoration Site. For each AA the same CRAM module will be used that was used for determining baseline conditions. For each AA, target CRAM scores have been determined based on baseline conditions of the resources to be restored, analysis of the metrics that could be expected to improve as a result of the mitigation activities, and comparison with on-site resources.

Since none of the AAs directly surrounding the Joey Stream Restoration Site contain representative alluvial fan habitat, AAs #9 and #10 (Figure 48) within Munz Canyon will be used as reference. AA #10 is located within the Alluvial Fan upstream of the Munz Canyon Dam and AA #9 is located at the downstream end of the existing outflow channel where it flows back onto the alluvial fan. Following post-fire revegetation these AA's are expected to be characteristic of the alluvial fan habitats in the Joey Stream Restoration Site. As such, AAs #9 and #10 are suitable reference sites for re-established alluvial fan habitats at AA #2. The post-fire restoration CRAM score at AA #10 is expected to be 85, and the CRAM score at AA #9 is expected to be 85. Therefore, the target overall CRAM score for re-established alluvial fan habitats associated within the Joey Stream Restoration Site is 85 (Table 42).

Table 42. CRAM Performance Standard for AAs at the Joey Stream Restoration Site

Metric/ Submetric	Year 1	Year 2	Year 3	Year 4	Year 5	Final
Buffer and Landscape Context	NA	NA	92	92	92	92
Hydrology	NA	NA	92	92	92	92
Physical Structure	NA	NA	63	63	75	75
Biotic Structure	NA	NA	61	61	78	78
Overall	NA	NA	78	78	85	85

5.6.2 Uniform Performance Standards

The Joey Stream Restoration Site will be monitored for measurable metrics that will demonstrate the success of the mitigation activities (Table 43). These performance standards will be monitored along permanent transects (Figure 56) and will assess the physical, hydrological, and biological aspects of the habitat affected by the mitigation actions. In the fire-affected Elizabeth Lake Bank Property, reference sites will use pre-fire vegetation data as a baseline for comparison since the vegetation site-wide is still recovering from the fire. Pre-fire vegetation data was collected in 2011 by WRA as part of the BRI surveys (WRA 2011), and is included in Exhibit H of the BEI. The percent cover for vegetation, as described in Table 43, was calculated using this pre-fire vegetation data as a reference site, in accordance with UPS protocol. Transect 9 is the only transect located in the Joey Stream Restoration Site, and traverses the alluvial fan near the middle of the site. Because this transect is located within the bounds of the Joey Stream Restoration Site, a transect (Transect 2) in an adjacent alluvial fan will be used as reference.

Table 43. Uniform Performance Standards for the Joey Stream Restoration Site

Type	Uniform Performance Standard	Year 1	Year 2	Year 3	Year 4	Year 5	Final
Physical:	*UPS #2*	The mitigation retains or increases stream stability and does not cause site, upstream, or downstream excessive erosion or aggradation. Specifically: Overall channel form should not indicate a consistent trajectory indicating a transition from a multi-thread to a single thread channel form.					
Hydrologic:	*Custom*	Field indicators of Ordinary High Water and distinct hydrogeomorphic floodplain units will be documented within the alluvial floodplain.					
Biological[1]:	*UPS #28 Dominance of Natives*	Cover of native species will be at least 5% absolute cover	Cover of native species will be at least 10% absolute cover	Cover of native species will be at least 20% absolute cover	Cover of native species will be at least 30% absolute cover	Cover of native species will be at least 50% absolute cover	Cover of native species will be at least 50% absolute cover
	UPS #29 Dominance of Exotics[2]	Relative cover of non-native, invasive species will be 0%.					
	UPS #31 Species Richness	Number of native species in planting areas ≥ 14 species					

1. Percent cover estimates were calculated using UPS standards and pre-fire vegetation data from reference sites within the Elizabeth Lake Bank Property. See Exhibit H of the BEI for these data.
2. Excluding non-native annual grasses listed as highly invasive Cal-IPC (2006) , which will be ≤ 10% cover.

6.0 OTHER MITIGATION ACTIVITIES

Portions of Area F outside the restoration sites will be enhanced through post-fire monitoring and management and cattle exclusion.

6.1 Mitigation Activities Outside of the Restoration Areas

6.1.1 Fire-Related Mitigation Activities

Post-fire monitoring and management will occur throughout Area F, as described in Part I – Section 5.2.1.

6.1.2 Cattle Exclusion

Cattle will be excluded from the northern and northeastern portions of Area F (Figure 53), as described in Part I – Section 5.1.

6.1.3 Conservation Easement

A conservation easement will be established over the Bank Property, as described in Part I – Section 5.0. All habitats will be managed in perpetuity to protect their functions and conditions.

6.2 Mitigation Types Outsides of the Restoration Areas

6.2.1 Enhancement

Post-fire monitoring and management and cattle exclusion will result in enhancement of all covered habitats and species. Additionally, in some instances, upstream restoration actions described above will restore natural hydrologic regimes and sediment deposition that will enhance down-stream resources.

6.2.2 Preservation

The conservation easement will result in preservation of all covered species and habitat types within Area E that are not associated with a restoration site or otherwise enhanced, and will preserve these resources in perpetuity.

6.3 Credits Generated Outside of the Restoration Areas

Ex. 4 CBI

Ex. 4 CBI

[WRA] WRA, Inc. 2013b. Delineation of Potential Jurisdictional Wetlands and Non-Wetland Waters Under Section 404 of the Clean Water Act, Porter-Cologne Water Quality Control Act, and Section 1600 of the California Fish and Game Code. Petersen Ranch. Los Angeles County, California. February 2013.

PART IX. APPENDICES

Appendix A: Figures

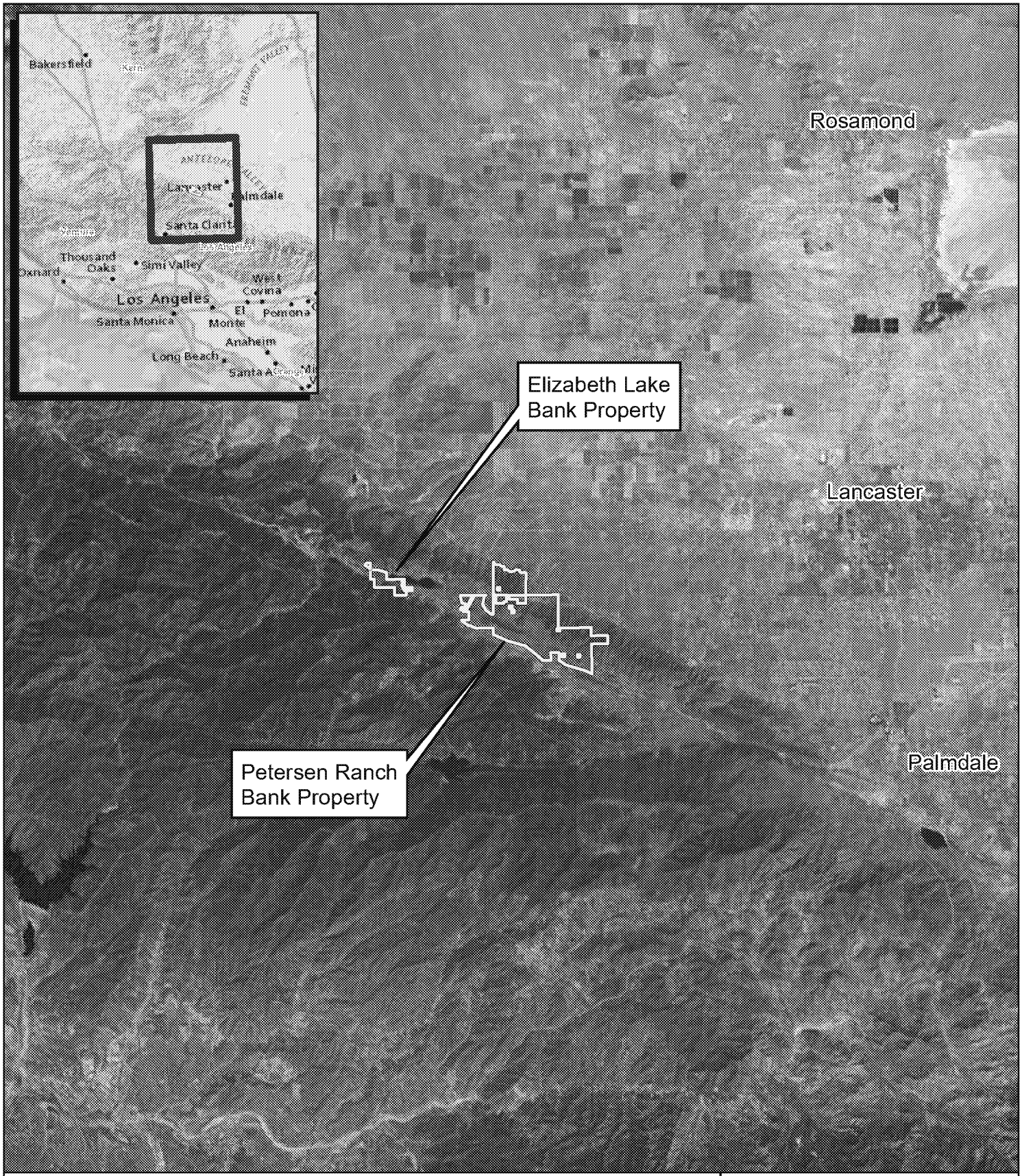


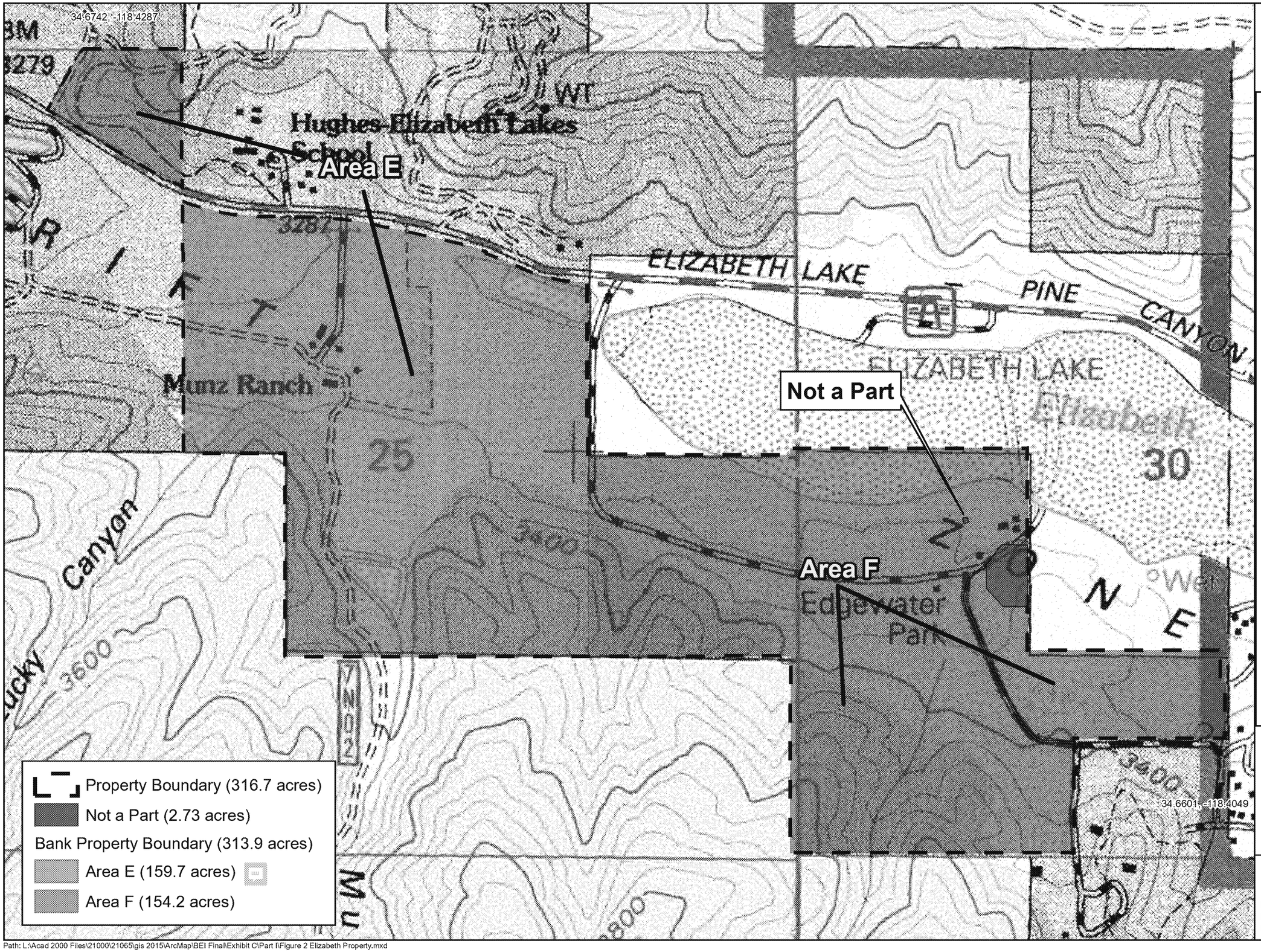
Figure 1. Location Map

Petersen Ranch Mitigation Bank
Los Angeles County, California

wra
ENVIRONMENTAL CONSULTANTS

Map Date: June 2015
Map By: Chris Zumwalt
Base Source: ESRI Microsoft 5/8/10

Path: L:\Acad 2000 Files\21000\21065\gis 2015\ArcMap\BEI Final\Exhibit C\Figure 1 Location Map.mxd



wra
ENVIRONMENTAL CONSULTANTS

Petersen Ranch
Mitigation Bank

Los Angeles County,
California

Figure 2.

Elizabeth Lake
Bank Property Map

Map Date: June 2015
Map By: Chris Zumwalt
Base Source: USGS 7.5 min. quad

Path: L:\Acad 2000 Files\21000\21065\gis 2015\ArcMap\BEI Final\Exhibit C\Part I\Figure 2 Elizabeth Property.mxd

wra
ENVIRONMENTAL CONSULTANTS

Petersen Ranch
Mitigation Bank

Los Angeles County,
California

Figure 3.

Petersen Ranch
Bank Property Map

Area A
Area B
Area C
Area D
Area A
34.6611
-118.3772
34.6245
-118.3045
Johnson Summit
Cochems Ranch
Andrade Corner
Pitchfork Ranch
Leona Valley Ranch
Graves
Water Tank
Mile 330
SAN ANDREAS
RIFT ZONE
LEONA VALLEY
Amargosa Creek
Tunnel
Spring
Well
ROAD
NORTHSIDE DRIVE
AVENUE
SCALE 1:24 000
R 14 W
R 13 W

Property Boundary (3,911.9 acres)
SCE Boundary (319.9 acres)
Not a Part (123.01 acres)
Bank Property Boundary (3,788.9 acres)
Area A (1,386.1 acres)
Area B (512.1 acres)
Area C (657..6 acres)
Area D (1,233.1 acres)

N
W E
S

0 2,000 4,000
Feet

Map Date: June 2015
Map By: Chris Zumwalt
Base Source: USGS 7.5 min. quad

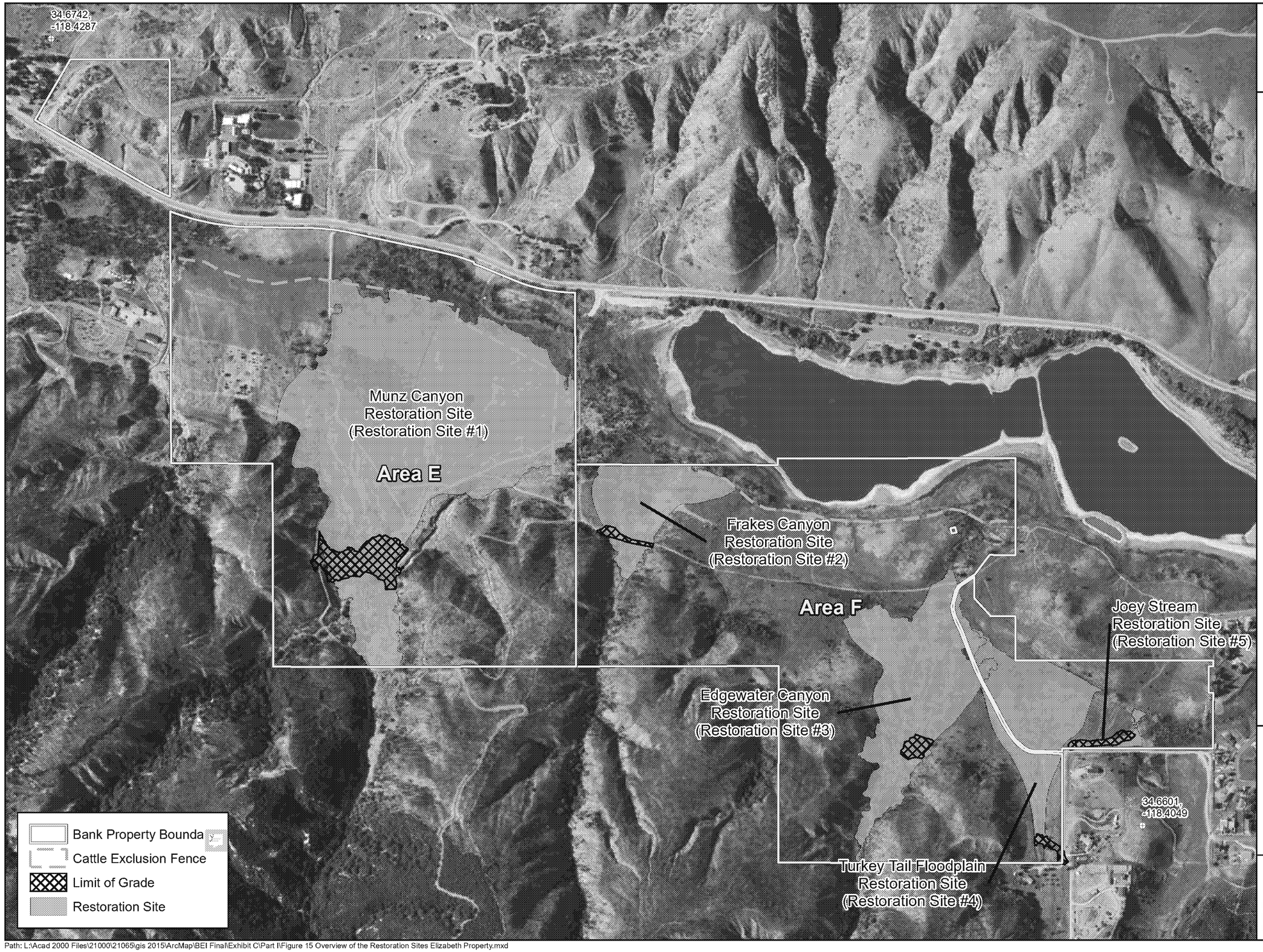
Path: L:\Acad 2000 Files\21000\21065\gis 2015\ArcMap\BEI Final\Exhibit C\Part I\Figure 3 Petersen Property.mxd

ED_013814_00002316-00114

Ex. 4 CBI

Ex. 4 CBI

Ex. 4 CBI



wra
ENVIRONMENTAL CONSULTANTS

Petersen Ranch
Mitigation Bank

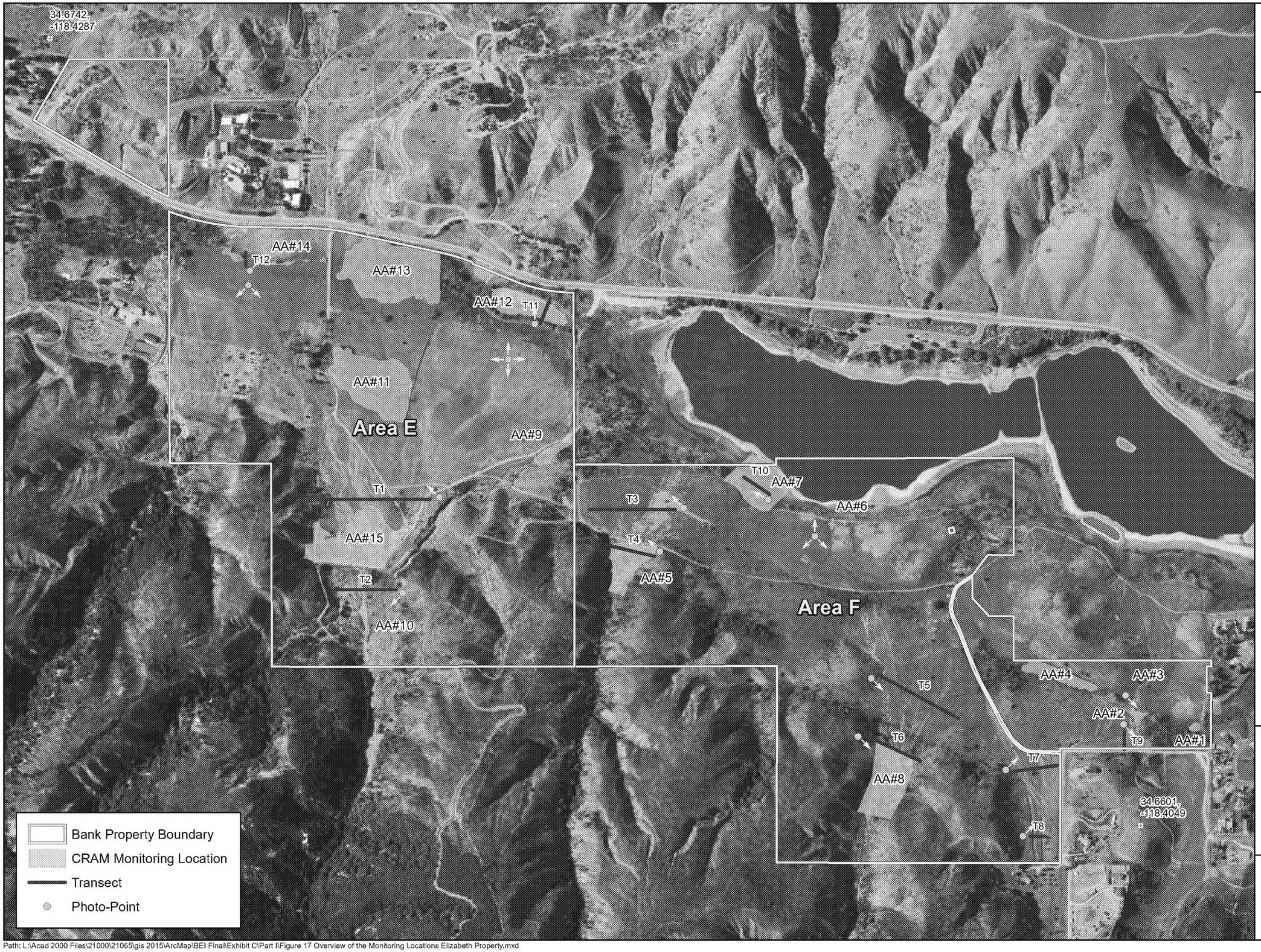
Los Angeles County,
California

Figure 15.

Overview of the
Mitigation Activities
Planned in the
Elizabeth Lake
Bank Property

Map Date: July 2015
Map By: Chris Zumwalt
Base Source: ESRI Streaming 5/8/2010

Path: L:\Acad 2000 Files\21000\21065\gis 2015\ArcMap\BEI Final\Exhibit C\Part I\Figure 15 Overview of the Restoration Sites Elizabeth Property.mxd



wra
ENVIRONMENTAL CONSULTANTS

Petersen Ranch
Mitigation Bank

Los Angeles County,
California

Figure 17.

Overview of the
Monitoring Locations
in the Elizabeth Lake
Bank Property

N
W E
S

0 600 1,200
Feet

Map Date: July 2015
Map By: Chris Zumwalt
Base Source: ESRI Streaming 5/8/2010

Path: L:\Acad 2000 Files\21000\21065\gis 2015\ArcMap\BEI Final\Exhibit C\Part I\Figure 17 Overview of the Monitoring Locations Elizabeth Property.mxd

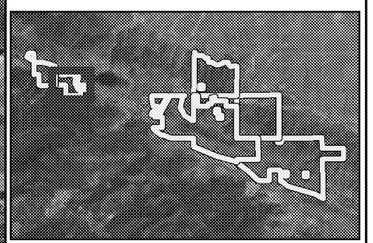
wra
ENVIRONMENTAL CONSULTANTS

Petersen Ranch
Mitigation Bank

Los Angeles County,
California

Figure 53.

Area F - Location of
the Restoration Sites
in Area F



N
W E
S

0 360 720
Feet

Map Date: July 2015
Map By: Chris Zumwalt
Base Source: ESRI Streaming 5/8/2010

Path: L:\Acad 2000 Files\21000\21065\gis 2015\ArcMap\BEI Final\Exhibit C\Part VII\Figure 53 Area F Restoration Sites Elizabeth Lake Property.mxd

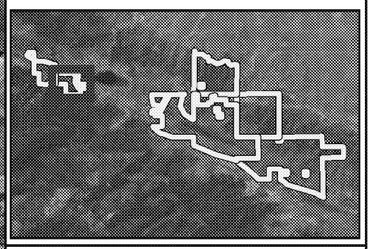
wra
ENVIRONMENTAL CONSULTANTS

Petersen Ranch
Mitigation Bank

Los Angeles County,
California

Figure 56.

Area F - Monitoring
Locations for Area F

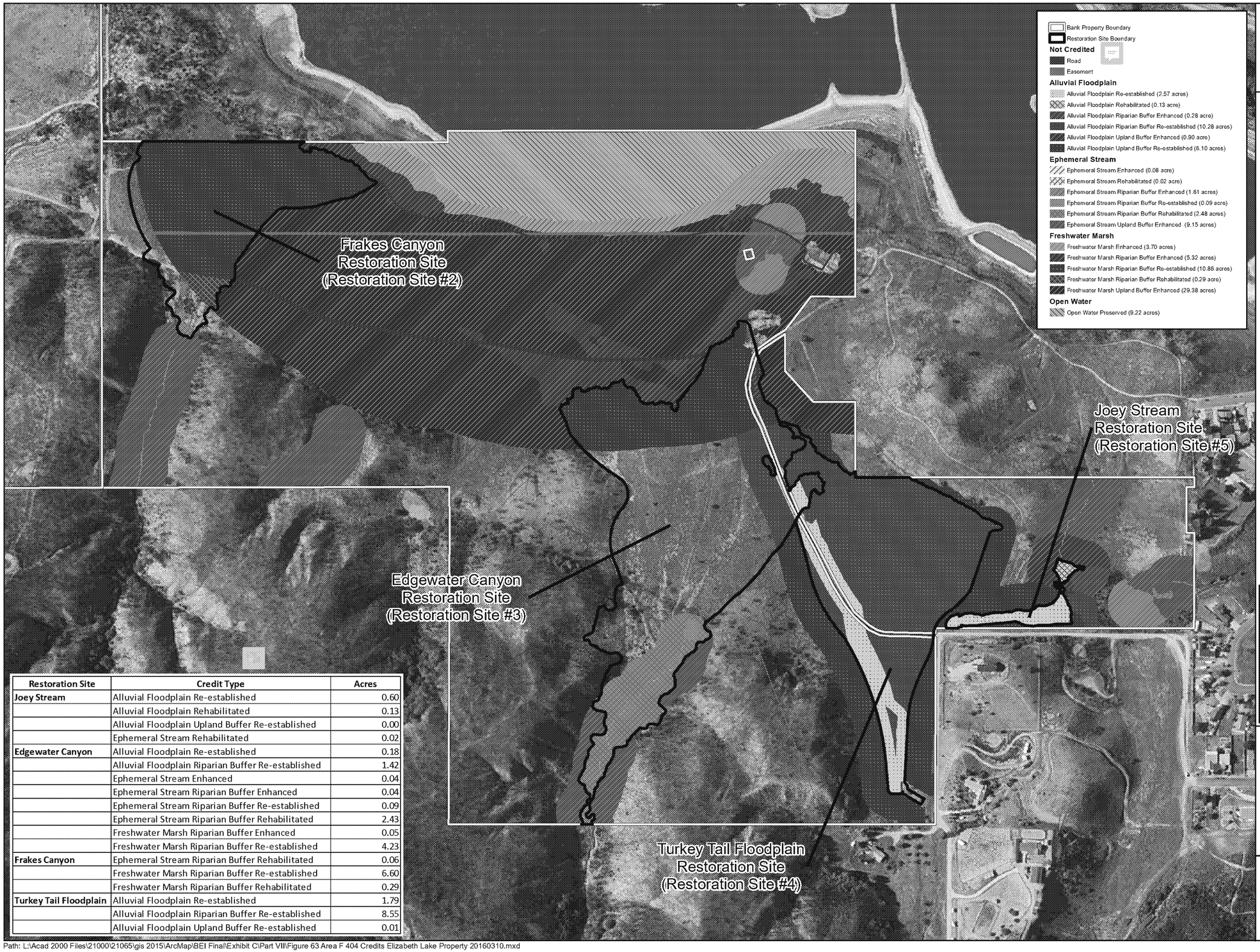


N
W E
S

0 350 700
Feet

Map Date: July 2015
Map By: Chris Zumwalt
Base Source: ESRI Streaming 5/8/2010

Path: L:\Acad 2000 Files\21000\21065\gis 2015\ArcMap\BEI Final\Exhibit C\Part VII\Figure 56 Area F Monitoring Locations Elizabeth Lake Property.mxd



Restoration Site	Credit Type	Acres
Joey Stream	Alluvial Floodplain Re-established	0.60
	Alluvial Floodplain Rehabilitated	0.13
	Alluvial Floodplain Upland Buffer Re-established	0.00
	Ephemeral Stream Rehabilitated	0.02
Edgewater Canyon	Alluvial Floodplain Re-established	0.18
	Alluvial Floodplain Riparian Buffer Re-established	1.42
	Ephemeral Stream Enhanced	0.04
	Ephemeral Stream Riparian Buffer Enhanced	0.04
	Ephemeral Stream Riparian Buffer Re-established	0.09
	Ephemeral Stream Riparian Buffer Rehabilitated	2.43
	Freshwater Marsh Riparian Buffer Enhanced	0.05
	Freshwater Marsh Riparian Buffer Re-established	4.23
Frakes Canyon	Ephemeral Stream Riparian Buffer Rehabilitated	0.06
	Freshwater Marsh Riparian Buffer Re-established	6.60
	Freshwater Marsh Riparian Buffer Rehabilitated	0.29
Turkey Tail Floodplain	Alluvial Floodplain Re-established	1.79
	Alluvial Floodplain Riparian Buffer Re-established	8.55
	Alluvial Floodplain Upland Buffer Re-established	0.01

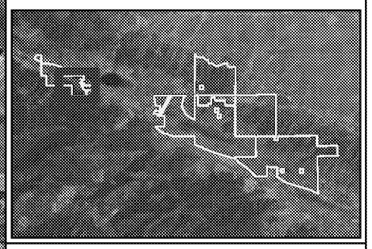
wra
ENVIRONMENTAL CONSULTANTS

Petersen Ranch Mitigation Bank

Los Angeles County, California

Figure 63.

Area F - 404 Mitigation Types

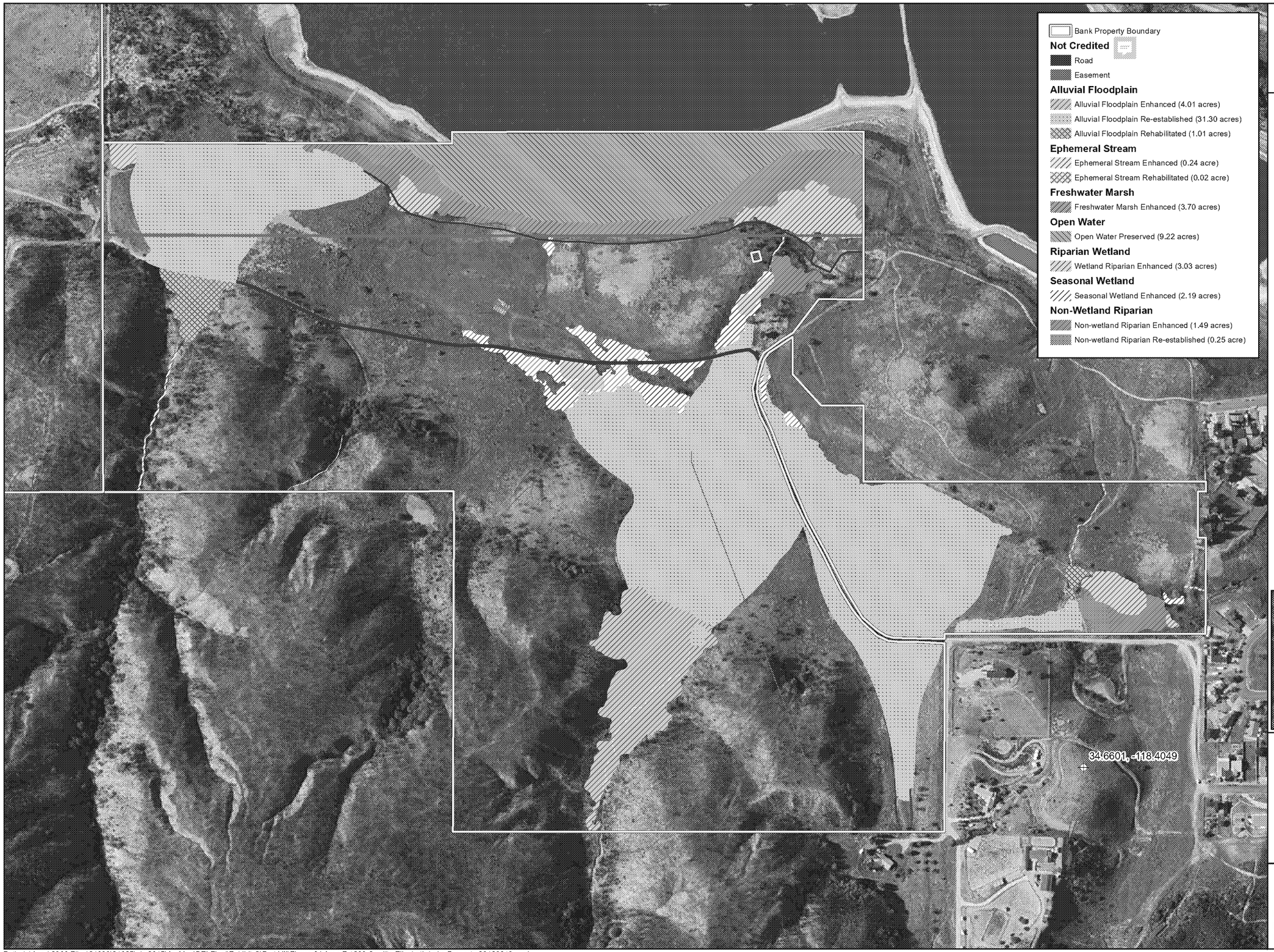


N
W E
S

0 350 700
Feet

Map Date: 3/10/2016
Map By: fhourigan
Base Source: ESRI Streaming 5/8/10

Path: L:\Acad 2000 Files\21000\21065\gis 2015\ArcMap\BEI Final\Exhibit C\Part VII\Figure 63 Area F 404 Credits Elizabeth Lake Property 20160310.mxd



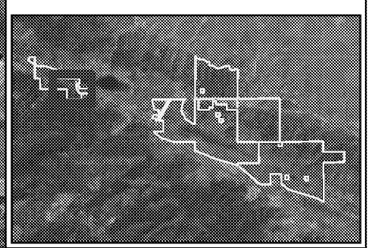
wra
ENVIRONMENTAL CONSULTANTS

Petersen Ranch Mitigation Bank

Los Angeles County, California

Figure 64.

Area F - 1600 Mitigation Types

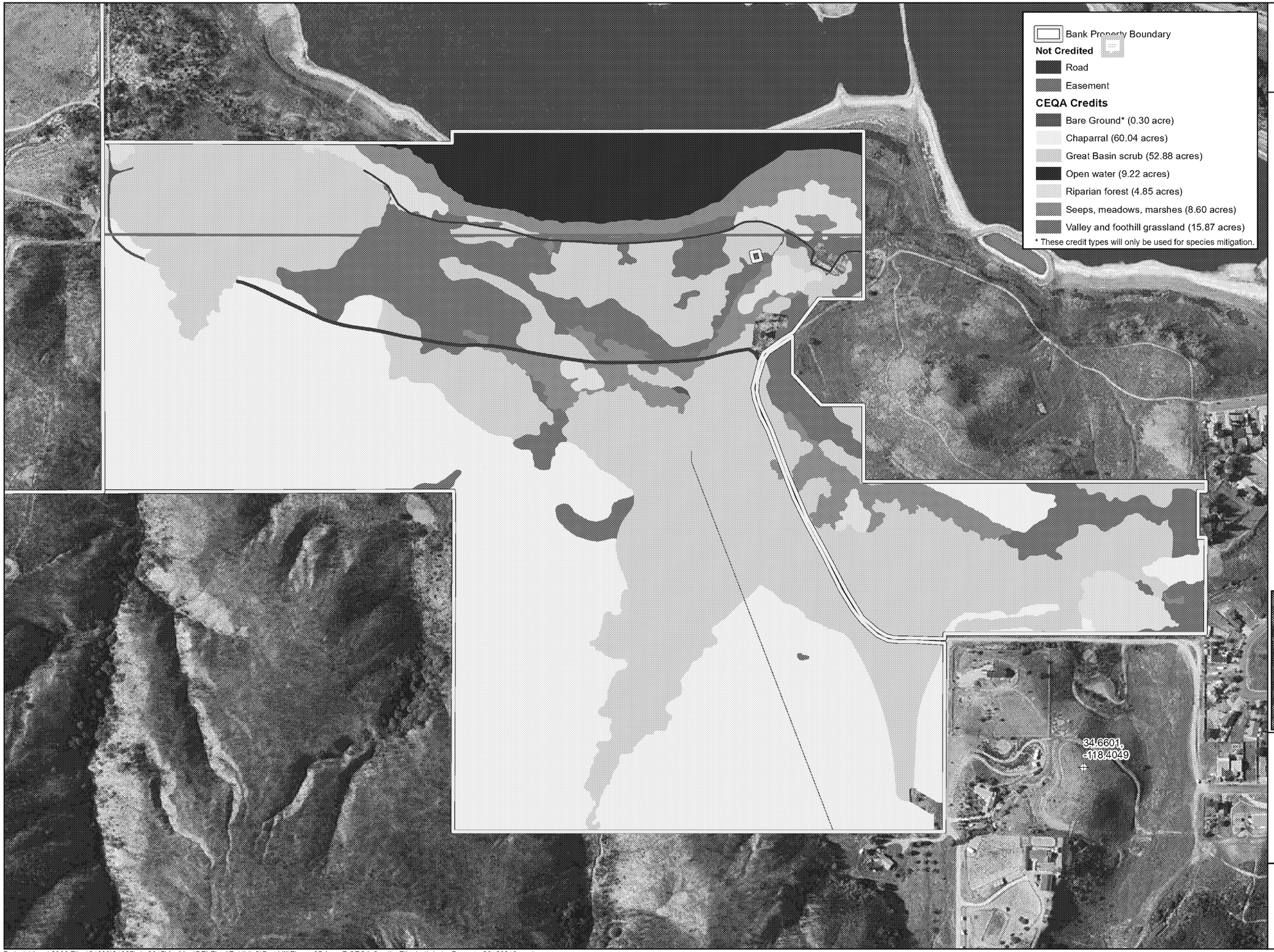


N
W E
S

0 350 700
Feet

Map Date: 3/10/2016
Map By: fhourigan
Base Source: ESRI Streaming 5/8/10

Path: L:\Acad 2000 Files\21000\21065\gis 2015\ArcMap\BEI Final\Exhibit C\Part VII\Figure 64 Area F 1600 Credits Elizabeth Lake Property 20160310.mxd



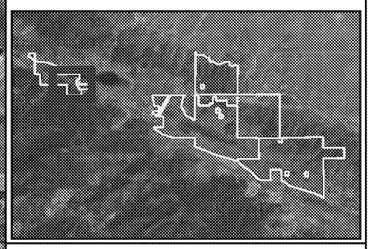
wra
ENVIRONMENTAL CONSULTANTS

Petersen Ranch Mitigation Bank

Los Angeles County, California

Figure 65.

Area F - CEQA Mitigation Types



N
W E
S

0 350 700
Feet

Map Date: 3/10/2016
Map By: fhourigan
Base Source: ESRI World Imagery 5/8/10

Path: L:\Acad 2000 Files\21000\21065\gis 2015\ArcMap\BEI Final\Exhibit C\Part VII\Figure 65 Area F CEQA Credits Elizabeth Lake Property 20160310.mxd

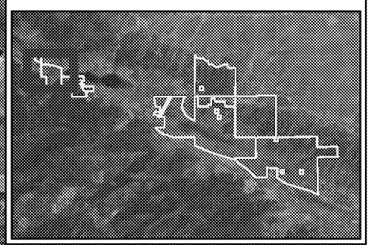
wra
ENVIRONMENTAL CONSULTANTS

Petersen Ranch
Mitigation Bank

Los Angeles County,
California

Figure 66.

Area F - Swainson's Hawk
Mitigation Types



N
W E
S

0 350 700
Feet

Map Date: 3/10/2016
Map By: fhourigan
Base Source: ESRI Streaming 5/8/10

Path: L:\Acad 2000 Files\21000\21065\gis 2015\ArcMap\BEI Final\Exhibit C\Part VII\Figure 66 Area F CESA Credits Elizabeth Lake Property 20160310.mxd